the OIL AND GAS JOURNAL

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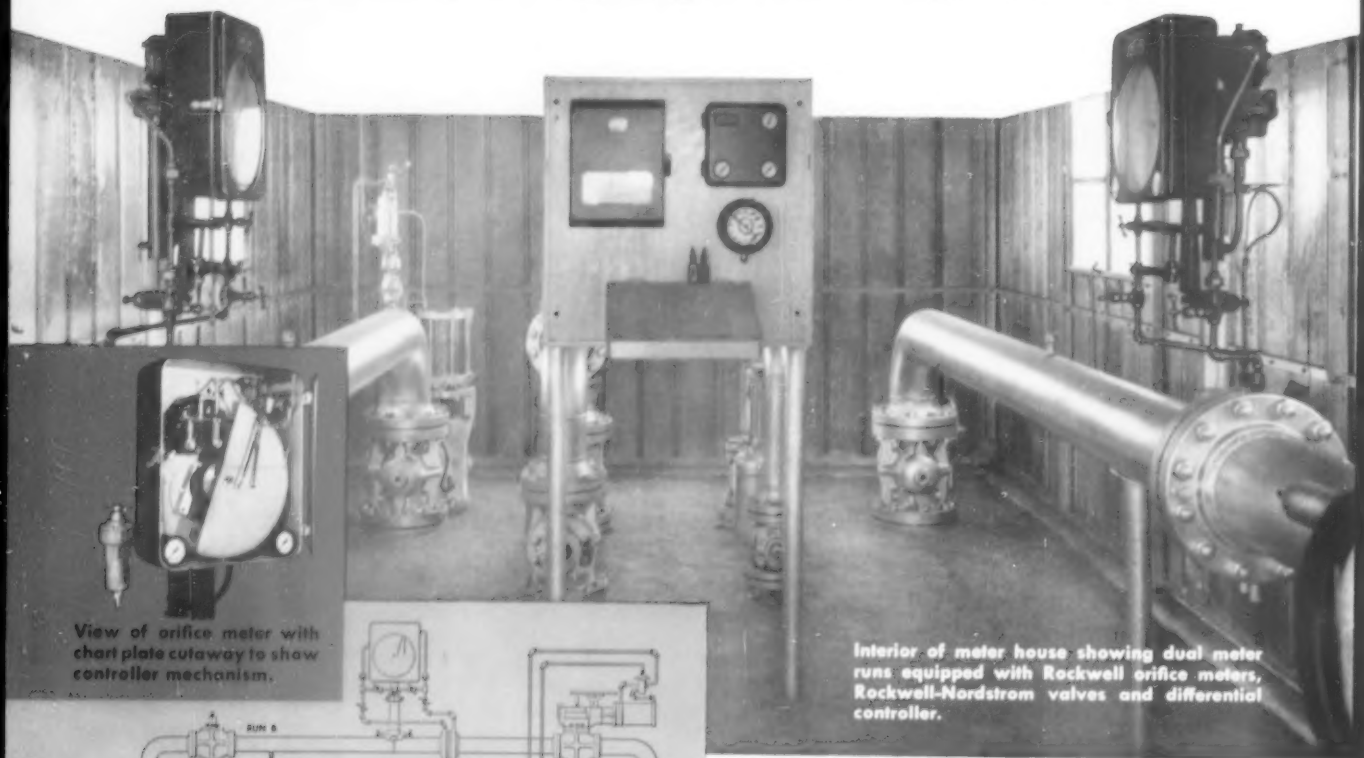
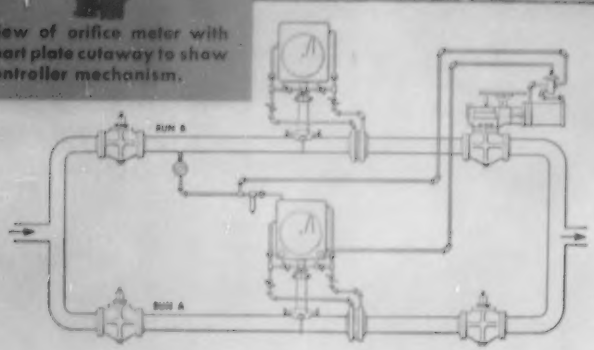
PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 7 SEPTEMBER 27, 1954

Here's A *NEW* and *BETTER* Way To Measure Widely Varying Flows By Orifice



View of orifice meter with chart plate cutaway to show controller mechanism.

Interior of meter house showing dual meter runs equipped with Rockwell orifice meters, Rockwell-Nordstrom valves and differential controller.



Set It... Forget It!

In the Rockwell system, as shown above, the differential control mechanism is incorporated within the case of the Rockwell meter on Run "A." Its purpose is to open or close the Nordstrom cylinder operated valve downstream from the meter on Run "B." Run "A" is on stream at all times.

For example, the Rockwell Differential Controller may be set so that when the differential on a 100" range meter reaches 80", it automatically causes the cylinder operated valve to open, thereby placing the standard flow meter in operation. The differential on the standard meter and the controller will then equalize at some point below 80". When the differential on the standard meter reaches 10", the controller closes the valve and the standard meter is taken out of service.

This mechanical arrangement is entirely automatic. Controllers are available for all standard pressure and differential ranges of Rockwell orifice meters.

with the ROCKWELL DIFFERENTIAL CONTROLLER

With a simple manifold of two Rockwell orifice meters governed by a Rockwell differential controller and a cylinder operated Nordstrom valve, you can now get perfect accuracy when measuring widely varying flow rates. That's because the installation can be tailored to the need. For example, one of the two meter runs could be 4" pipe—the other 12". The use of a cylinder operated Nordstrom eliminates the need and the space taken by a diaphragm type differential valve and leaves no doubt as to a complete shut-off. In many instances, no new valve will be required—simply add a cylinder operator to an existing Nordstrom. This system requires less space and pipe—is more economical to buy and install, most dependable in operation. Write for complete details.

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SEPTEMBER 27, 1954 VOL. 53 NO. 21

OIL IN THE NEWS . . .

Attorneys for 106 Objecting Companies Challenge FPC Authority 44
I.P.A.A. Strikes Out at U. S. Participation in Tariff, Trade Agreement 47
Last Quarter Imports Will Top Final 1953 Quarter by 6 Per Cent 47
New Tide Water Refinery May Have 130,000-Bbl. Capacity 48
Indiana Standard, Sinclair to Build Big Ammonia Plant 49
Field Use Proves New Down-Hole Drilling Tool Practical 49
Humble's Rex Baker Denounces FPC, Supreme Court Ruling 50
Knight Hints at Use of Strikes to Get Union Demands 51
Speakers Agree That Atomic Energy Will Compete With Oil 52
Industry Differs Over Value of Multiviscosity Lubes 54
Battle Near Over Ownership of Lands Off Louisiana 56
Quintana Asks Permit to Unitize East Long Mott Field 56
Texas Railroad Commission Again Reduces Allowable 57
Wildcats Indicate Production for Two Dry Basins 57
SACROC Begins Water Injection in Huge Flood Program 58
Exploration Increasing Along Pacific Northwest Line Route 59
Trans-Canada Signs 25-Year Pact With Northern Natural 60
Gas Flow of 500,000 Cu. Ft. Gaged in Australian Test 62
Drillers Racing Monsoon to Test Australia's Fitzroy Basin 63
Engineers Arrive to Plan Reopening of Iranian Oil Industry 64

NEWS FEATURES . . .

They Say 33
Calendar of Events 35
Journally Speaking 39
Editorial 41
This Week 43
Watching Washington 46
International News 62
Refining News 121
Personals 181
Deaths in the Industry 184
Statistical Summary 186
Drilling Statistics 187
Supply Statistics 188
Refining Statistics 189
Demand Statistics 190

TECHNOLOGY AND OPERATION . . .

[1]Calculation of Flow Temperature in Gas Pipeline 66
By Charles E. Schorre
[2]Redwood Steam Treaters Save Money 69
By Ralph W. Hill
Separation of Isobutylene 71
[3]Gas Injection Improves Low-Gravity Oil Recovery 74
[4]Defining Water Tables of Petroleum Reservoirs 78
Nondestructive Testing Detects Corrosion Damage 82
[5]Fresh Catalyst Addition to Cat Crackers 86
Gas Lift: Horsepower is Best Design Basis 91
Casmalia Lease Revived 96
Perforating Companies Reach Maturity 98
Engineering Reference Section 107-117
Pipeline Patrol: Quick Gas-Flow Calculations 125

DEPARTMENTS . . .

Engineering Fundamentals 107-9
Refiner's Notebook 111
Field Processing 115
Progress in Metals 117
Pipeline Patrol 125
Equipment Digest 131
Trade Literature 141
Equipment Men in News 147-195
Classified Advertising 191
Advertisers' Index 195

EXPLORATION . . .

Ellenburger Strikes Fire West Texas 157
Rockies Lead the Discovery Race 158

FIELDS . . .

Drilling Contractors 119
Area Field Reports 161

In Brief . . .

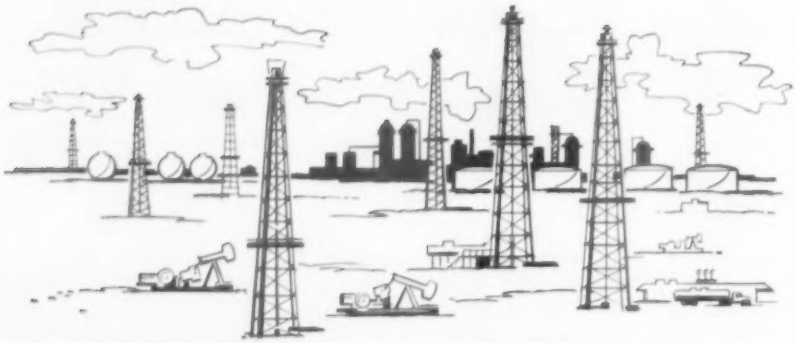
1. NEW FLOW EQUATION . . . An equation which will predict accurately the temperature of gas at any point along a transmission line has been developed by Transcontinental Gas Pipe Line Corp. It has proved accurate by actual tests for determining flow quantities under various conditions. Resultant calculations aid in specifying cooling equipment along the line.

2. TREATER COSTS LOWERED . . . Replacement of conventional steel treaters has virtually eliminated costs of treater corrosion and scale removal for Stanolind Oil & Gas Co. in field where corrosion and scaling are severe. Savings in scale-removing costs have varied from $50 to $115 per month for each installation.

3. INCREASED OIL RECOVERY . . . Unitization and pressure maintenance by gas injection in the Carneros Pool Unit of Salt Creek field have brought about two benefits. First, control of gas-oil ratios has allowed maximum benefits from gravity segregation. Second, injection has minimized irregular water encroachment, thus utilizing natural water drive without serious oil bypassing.

4. WHAT'S A WATER TABLE? . . . Water table is the surface formed by the top of the zone of essential water production, or the upper extent of the water as delineated by the water-oil and/or water-gas contact, says C. F. Knutson, Continental Oil Co., Los Angeles. Knutson points out advantages of such a universal definition in this article.

5. CATALYST ADDITION . . . There is a great deal of controversy as to the best way to add catalyst to fluid catalytic cracking units. Here are the ways in which three large Gulf Coast operators handle this problem.

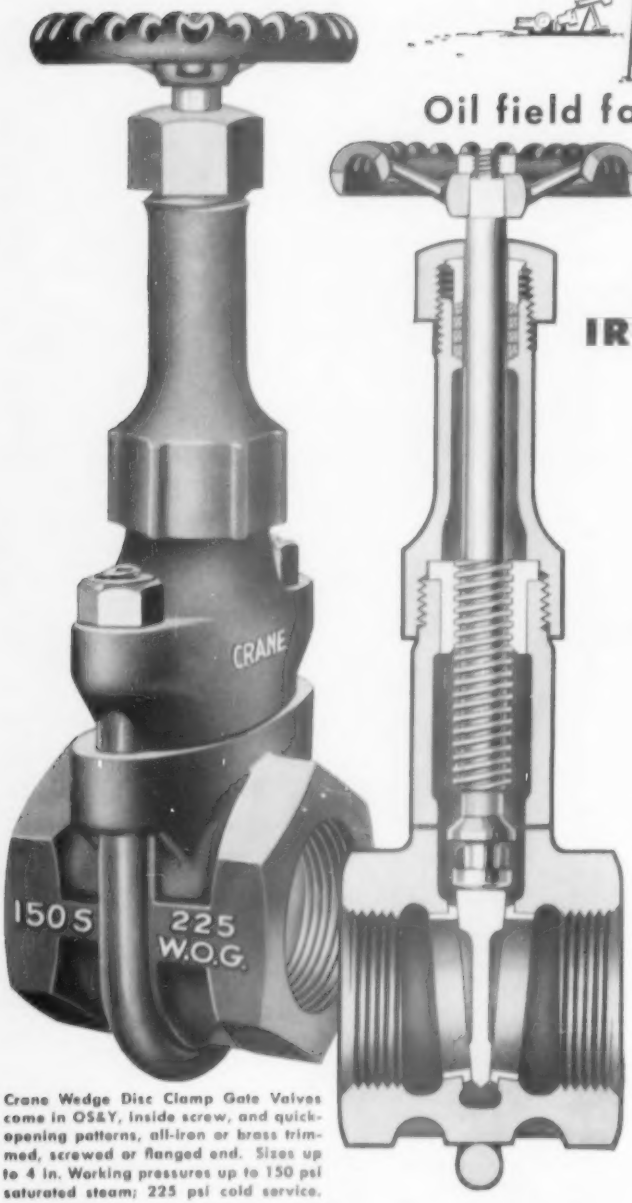


Oil field favorites...for **good** reasons

CRANE

IRON BODY—WEDGE DISC

clamp gates



Crane Wedge Disc Clamp Gate Valves come in OS&Y, inside screw, and quick-opening patterns, all-iron or brass trimmed, screwed or flanged end. Sizes up to 4 in. Working pressures up to 150 psi saturated steam; 225 psi cold service.

Versatile valves—excellent for crude, fuel, and lubricating oil—for air, gas, and gasoline. And use them too for steam, hot and cold water . . . even for corrosive chemicals and gasses. Your choice of regular patterns, all-iron or brass trimmed.

Dependable valves—because they're extra rugged, with a strong, reinforced body and husky stem. On inside screw all-iron valves, an improved self-draining bonnet prevents entrapment of line fluids in the bonnet—protects the threads, keeps the stem working smoothly.

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Colorado	Denver
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Louisiana	New Orleans
New Mexico	Hobbs
North Dakota	Williston
Oklahoma	Oklahoma City, Tulsa
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Grommet—T. M. The B. F. Goodrich Co.

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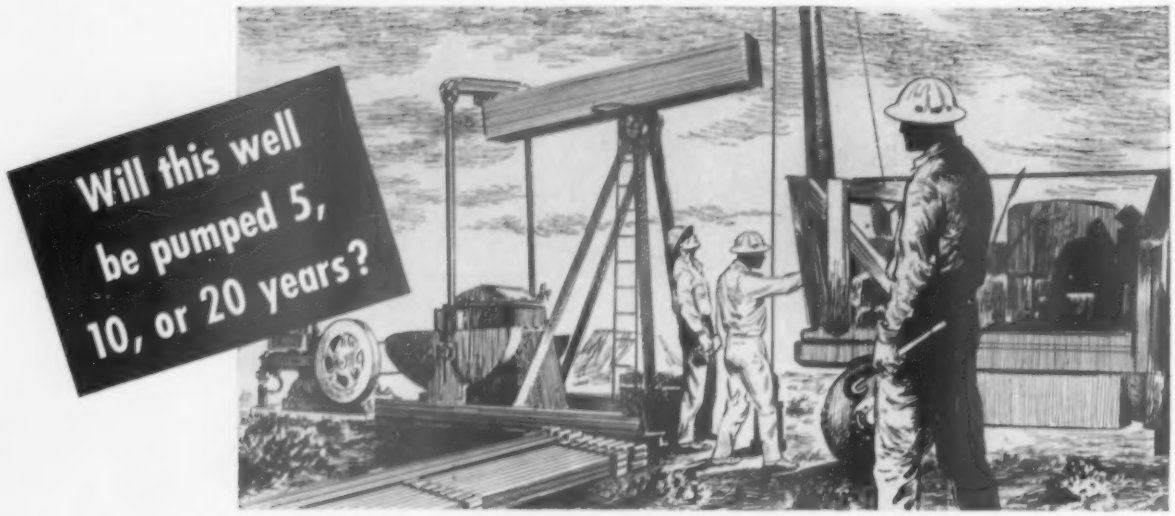
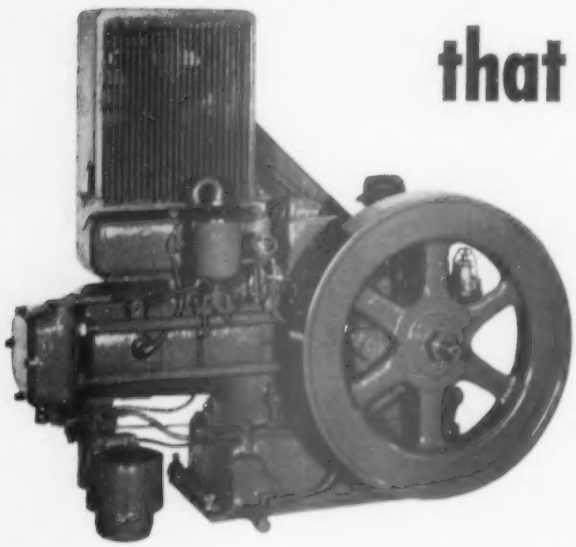
INDUSTRIAL PRODUCTS DIVISION



...then install a WITTE Engine that is built to last!



• The extra-strength and time-proven design features of Witte Gas-Gasoline Engines . . . plus their medium operating speed . . . keeps them operating 24 hours per day throughout the life of the well . . . with a minimum of maintenance.

During these years of operation, repairs can be made easily and inexpensively, since replaceable wet-type cylinder liners, shim adjustable tapered roller main bearings, replaceable valve-seat inserts and valve guides are Witte Engine features. In addition, all working parts are accessible for easy servicing.

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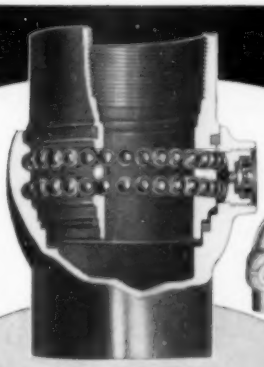

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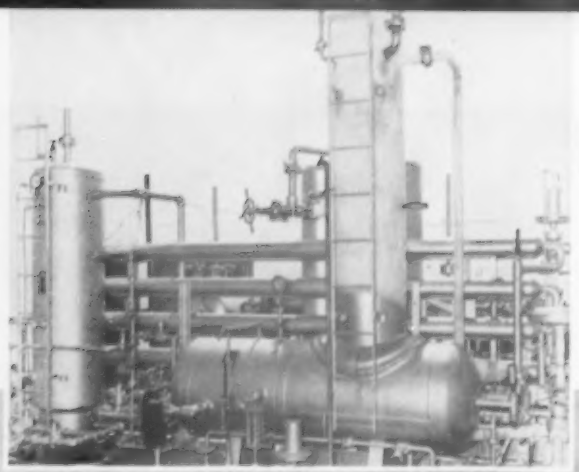
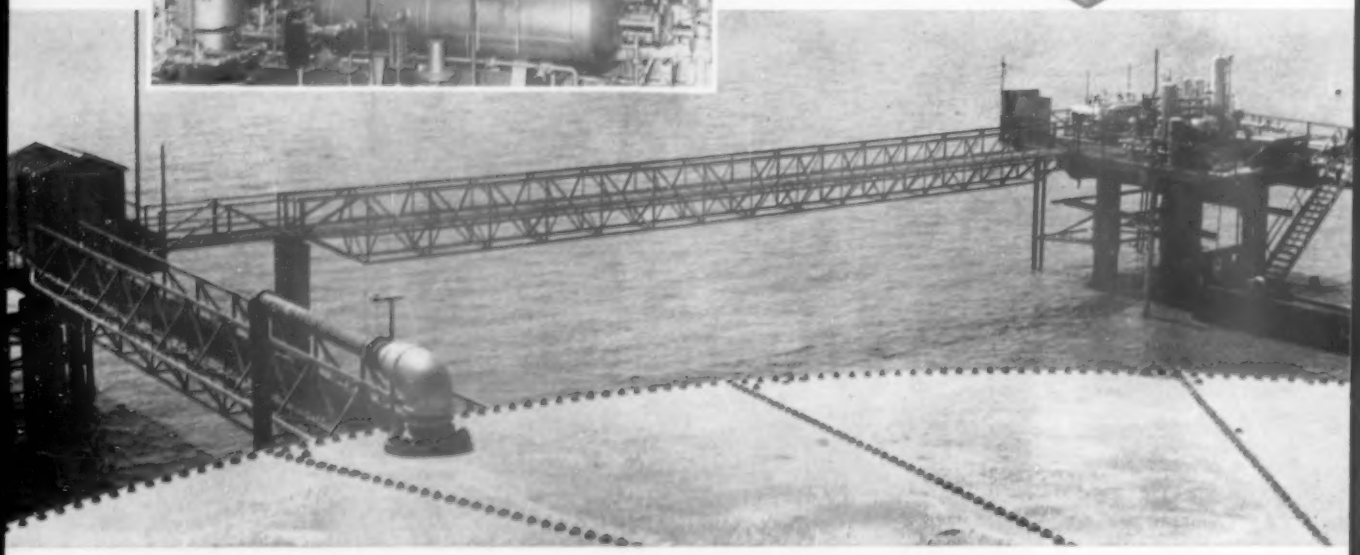


The extreme flexibility, dependable trouble-free performance, and high capacity of Parkersburg Hyreco Gas Processing Units is particularly advantageous in such locations as this typical off-shore installation.



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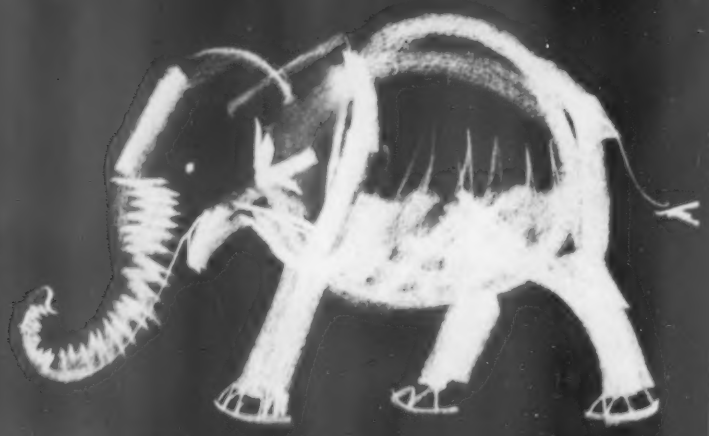

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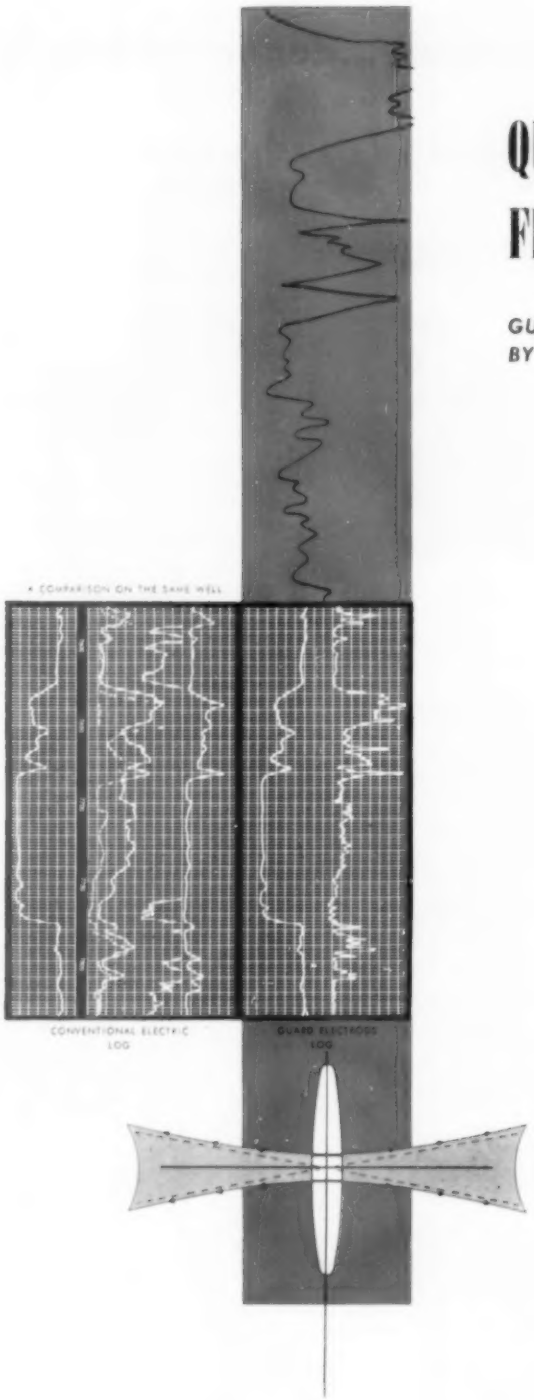

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GUARD LOG ACCURACY RELATIVELY UNAFFECTED BY SALINITY AND SPACING EFFECT

The controlled, "brute force" current of the Guard Electrode allows more accurate measurements of resistivity—even through extremely saline fluids. This unique ability, combined with a capacity for eliminating the variables of anomalies and spacing effect, gives new precision, new accuracy to correlation and fluid interpretation based on Guard Log data.

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in the measurement of percentage hydrogen

in liquid hydrocarbons

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utilizes radioisotopes

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- **Accurate to within 0.02 weight percent hydrogen**
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The New Cenco Beta Ray H/C Meter fills a long felt need in numerous petroleum processing operations . . . where the hydrogen-carbon ratio is altered . . . where the percentage of hydrogen is an index to the performance of end products such as jet fuels, fuel oils, gasolines, etc. Our Bulletin No. 115 contains full details about this precision instrument. Write for your copy today.

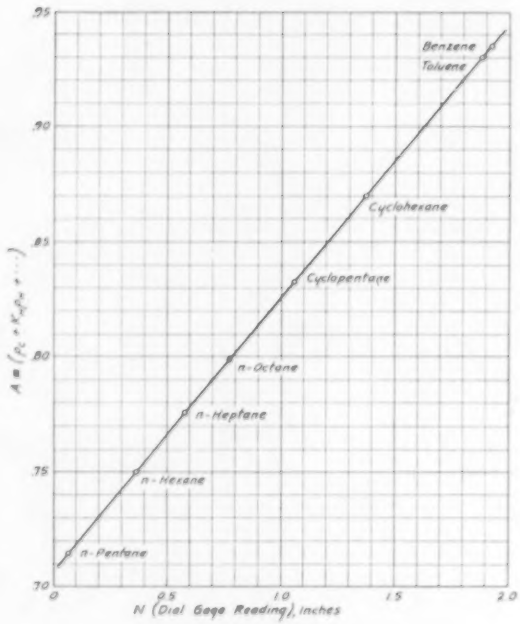

Fig 8. Typical Calibration Curve

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JOHNSTON drill stem testing NEWS

Items of interest to the members of the oil industry

SEPTEMBER 1954

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This Super-Accurate Testing Team gives more reliable drill stem tests than ever before possible—try it, see the difference it makes—faster going in the hole—faster coming out and a big increase in successful, conclusive tests.

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. . . proved perfect in hundreds of tests in the field, completely prevents extrusion or flow of the rubber packing! Here's how it works:

1 **Up to 3 Times More Clearance is possible** when going into the hole! The Bob Tail Packer can effectively use a smaller diameter rubber for extra clearance because there's no loss of rubber volume to extrusion!

2 **Pack-Off Is Up To 30% More Effective** since metal petal cups at base of packer **hold** the rubber in the pack-off zone!

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Type B HYDRAULIC TESTER

. . . prevents shock to formation, pipe and instruments and needs less water cushion!

Releases Pressure Slowly below the packer, thereby preventing shock to the test zone! The Type B Hydraulic Tester opens smoothly in stages during 2½ to 4 minutes! It's easy to spud through tight spots that may occur in open or uncased holes!

Positive Operation, Positive Interpretation! The compact, self-contained Johnston Hydraulic Tester opens easily by applying drill pipe weight, closes simply by removing weight! Functions accurately—reduces plugging and damage to wall of hole!

For The Accurate, Reliable DST service that you want, call Johnston Testers—the leader in new and improved DST technique since 1927.

JOHNSTON TESTERS

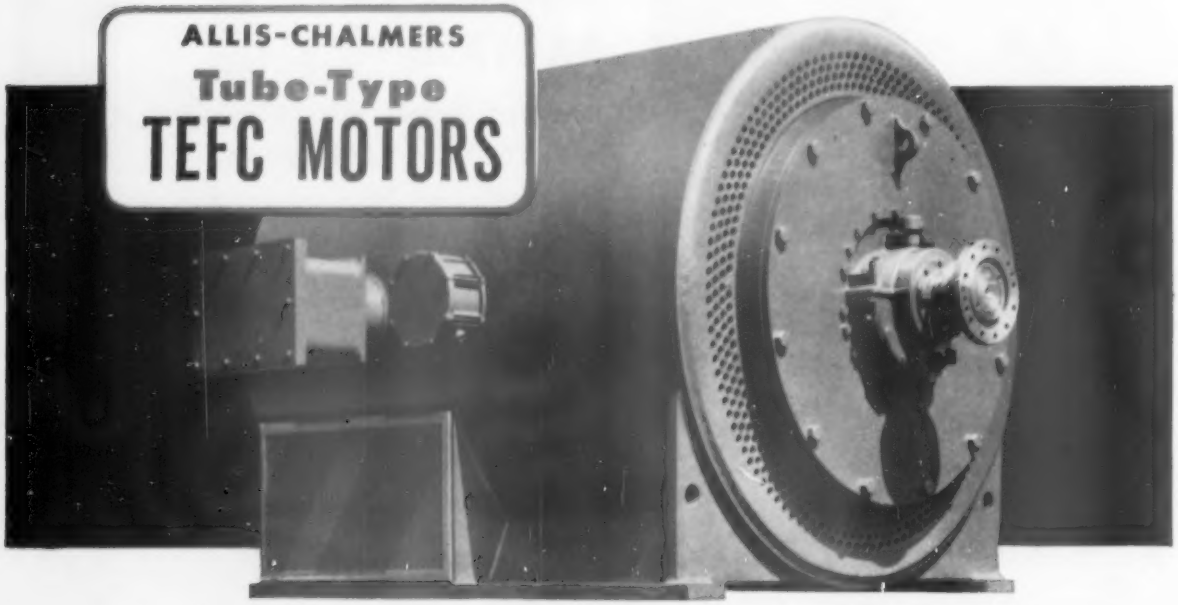
first in drill stem testing

HOUSTON, TEXAS

LOS ANGELES, CALIF • CALGARY, CAN.

CO-541

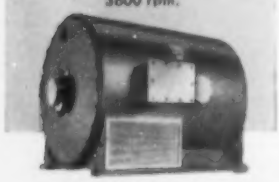
NOW 1250 Hp – 1780 Rpm
Underwriters' Approved
for Class I, Group D Service



Allis-Chalmers explosion-proof motors as large as 1250 hp, 2300 volts, 1780 rpm are now available with Underwriters' Laboratories, Inc. labels for operation in Class I, Group D hazardous locations.

Previous to recent tests, the Allis-Chalmers Underwriter-approved motor line included ratings up to 800 hp, 3600 rpm for operation in Class I, Group D and Class II, Group F and G locations. Now, with the design used for larger ratings also Underwriters' test-proved, Allis-Chalmers can supply explosion-proof motors in other ratings required by industry.

Ratings up to 800 hp, 3600 rpm.



Construction used for larger ratings.

Explosion-Proof Plus

Operation-proved by TEFC motors totaling over a quarter million horsepower, the A-C tube-type air-to-air heat exchanger design combines safety and maximum operating economy. Self-cleaning action cuts maintenance. Full internal air circulation lengthens insulation life. Complete enclosure protects stator core and other electrical parts from dirt and corrosion.

For approved motors for hazardous dust and gas locations, contact your A-C representative, or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4416

ALLIS-CHALMERS

ANCIENT meets MODERN...

Old Chain and Sprocket Pump Jack and VICKERS Modern Long Stroke HYDRAULIC PUMPING UNIT

The chain and sprocket pump jack shown in the foreground is an interesting link with the past. It is pumping a 400 ft well drilled more than 60 years ago.

Back of it is the most modern and efficient pumping unit available today . . . a Vickers Hydraulic Unit pumping from a depth of approximately 7,200 feet. Total well depth is about 9,000 feet.

Vickers Long Stroke Hydraulic Pumping Units provide reliable, efficient, low cost pumping for deep wells. Built in two stroke lengths (20 ft and 30 ft) they have many advantages including: fewer stress reversals, lower stress range, lower acceleration forces, lower peak loads, lower standing valve velocities, constant stroke rate, greater sub-surface efficiency. Results are lower maintenance cost, less down time, increased production and increased profit.

Write for Bulletin 53-51

Vickers Model JV-20400-AV
20-ft stroke length
7 strokes per minute
35,000 lb polished rod load capacity
(Also available in 30-ft stroke)

Vickers Long Stroke Hydraulic Pumping Unit installed in 1953 on Union Oil Company Torrey Well No. 93. Old chain and sprocket jack in foreground is pumping well drilled about 1890.

VICKERS Incorporated

DIVISION OF THE SPERRY CORPORATION

Petroleum Equipment Department

2160 EAST IMPERIAL HIGHWAY • EL SEGUNDO, CALIF.

Offices: 900 E. Second St., Odessa, Texas
317 Thompson Bldg., Tulsa, Okla.

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6893

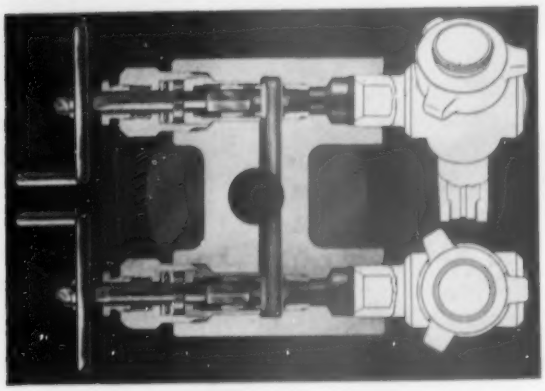
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

O·C·T

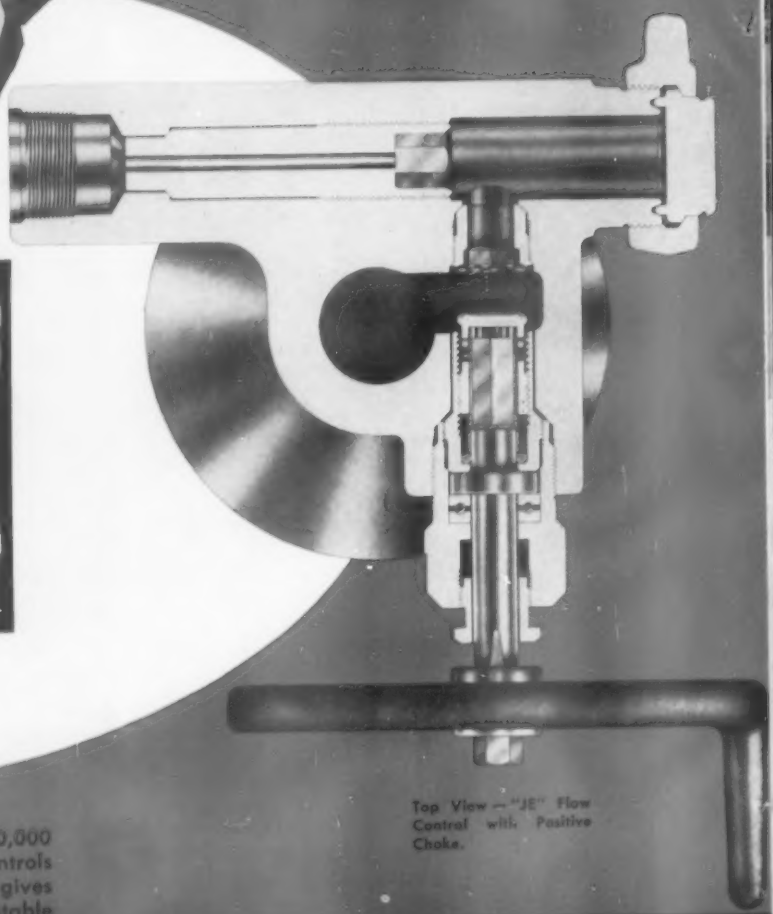
"JE"

FLOW CONTROLS

SPECIFY THE CONTROL THAT IS PROVED IN THOUSANDS OF INSTALLATIONS



The O-C-T Dual Flow Control is an outstanding companion to the "JE" Flow Control units which have gained universal acceptance in oilfields all over the world. This unit replaces 13 different fittings.



Top View — "JE" Flow Control with Positive Choke.

Here's the proof of the puddin'!: More than 10,000 successful applications of O-C-T "JE" Flow Controls . . . the only flow control on the market that gives you the advantage of both a choke (either adjustable or positive) and a true valve type gate assembly and seating arrangement . . . have proved them one of the most outstanding and dependable products ever offered the oil industry!

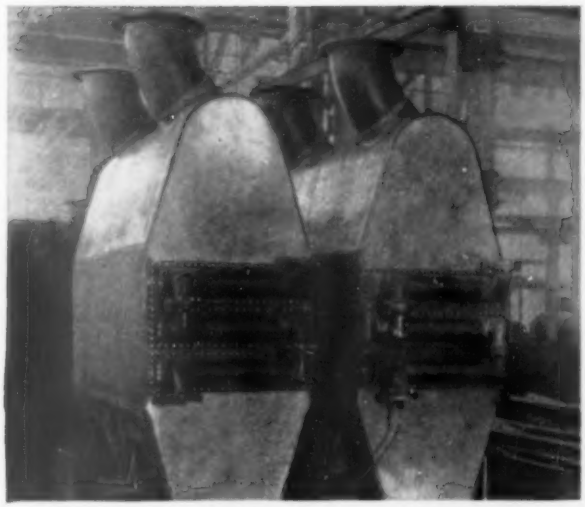
Why don't you take advantage of the savings and service this unit offers you? Before you top your next tree, let your O-C-T Representative tell you all the advantages and tremendous savings this remarkable O-C-T "JE" Flow Control unit offers you. Available through more than 700 supply store locations.

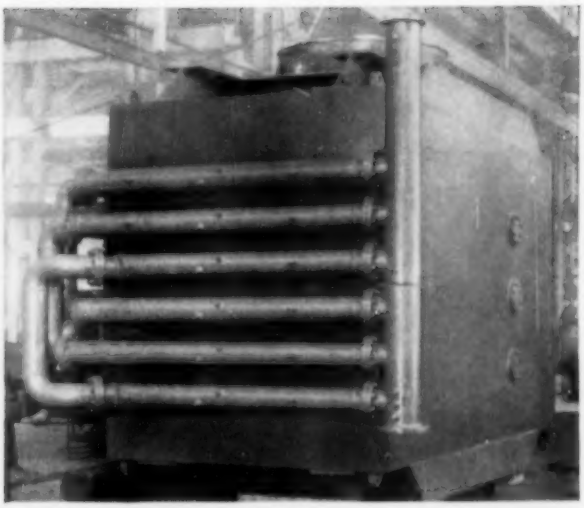
Oil Center Tool Co.

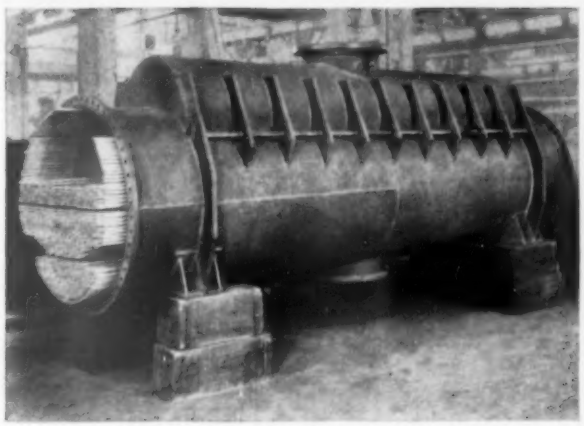
P. O. BOX 3091, HOUSTON, TEXAS

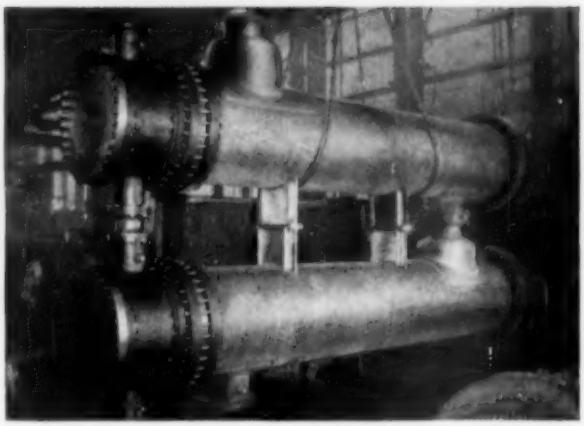
Export Representatives: Eastern Areas — Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

YOU CAN GET O-C-T "JE" FLOW CONTROLS ON ANY MAKE TREE









Even the most specialized exchangers and condensers

get a head start here!

On the assembly floors of the Kewanee-Ross plants in Buffalo, N. Y. and Kewanee, Ill., are Ross Exchangers and Surface Condensers of numerous designs.

Some are completely standardized . . . some partly standardized . . . others completely special.

But *all* have a big point in common: *They were off to a head start from the time Ross engineers were first consulted.*

Unsurpassed experience with a tremendous variety of both standard and special designs is usually able to produce successful precedents for most requirements. Often, for even the most specialized needs, standard components in a wide range of working pressures can be utilized at tremendous savings in cost and time . . . flanges, shell and floating head covers, tube sheets, tube layouts, shells, channels, for example. And from the all-important standpoint of fabricating facilities, the two, large, modern plants of Kewanee-Ross are equipped with the latest machines and tools to do the job better and faster.

Before you form your own opinion on how complex or specialized your condenser or exchanger has to be to meet your requirements, consult with a Kewanee-Ross engineering representative. A short talk can well result in many shortcuts to a satisfactory solution.

KEWANEE-ROSS CORPORATION

DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

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In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

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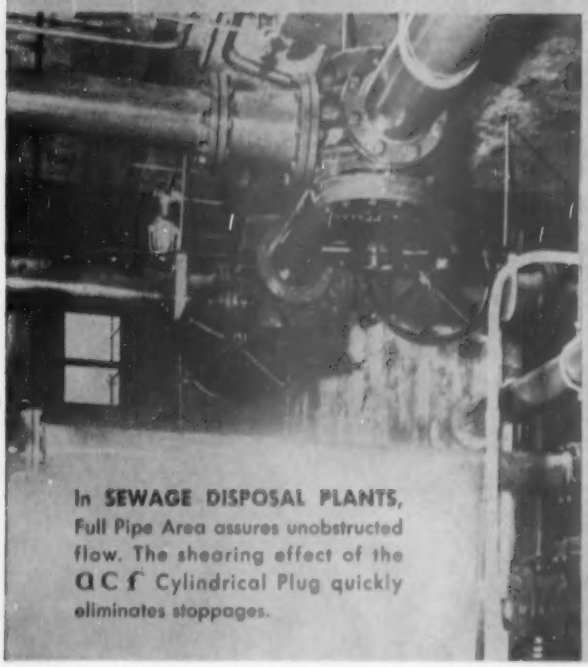
acf Cylindrical Plug Valves resist the abrasive effects of solids in suspension. This **CEMENT PLANT** installation has been in operation since 1949.

Split-second control is important in the **OIL FIELDS.** Quick quarter-turn shut-off of the acf Valve positively regulates the flow of lading.



In **SEWAGE DISPOSAL PLANTS,** Full Pipe Area assures unobstructed flow. The shearing effect of the acf Cylindrical Plug quickly eliminates stoppages.

acf Lubricated Plug Valves seal-in ladings such as at this **NATURAL GAS PLANT,** allow instant control with a minimum of maintenance.

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Electronic Data Processing Machine, Type 701

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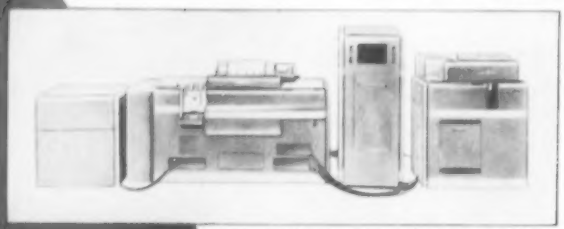

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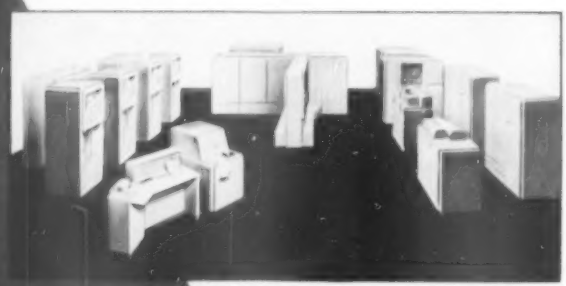
Electronic Calculator, Type 607



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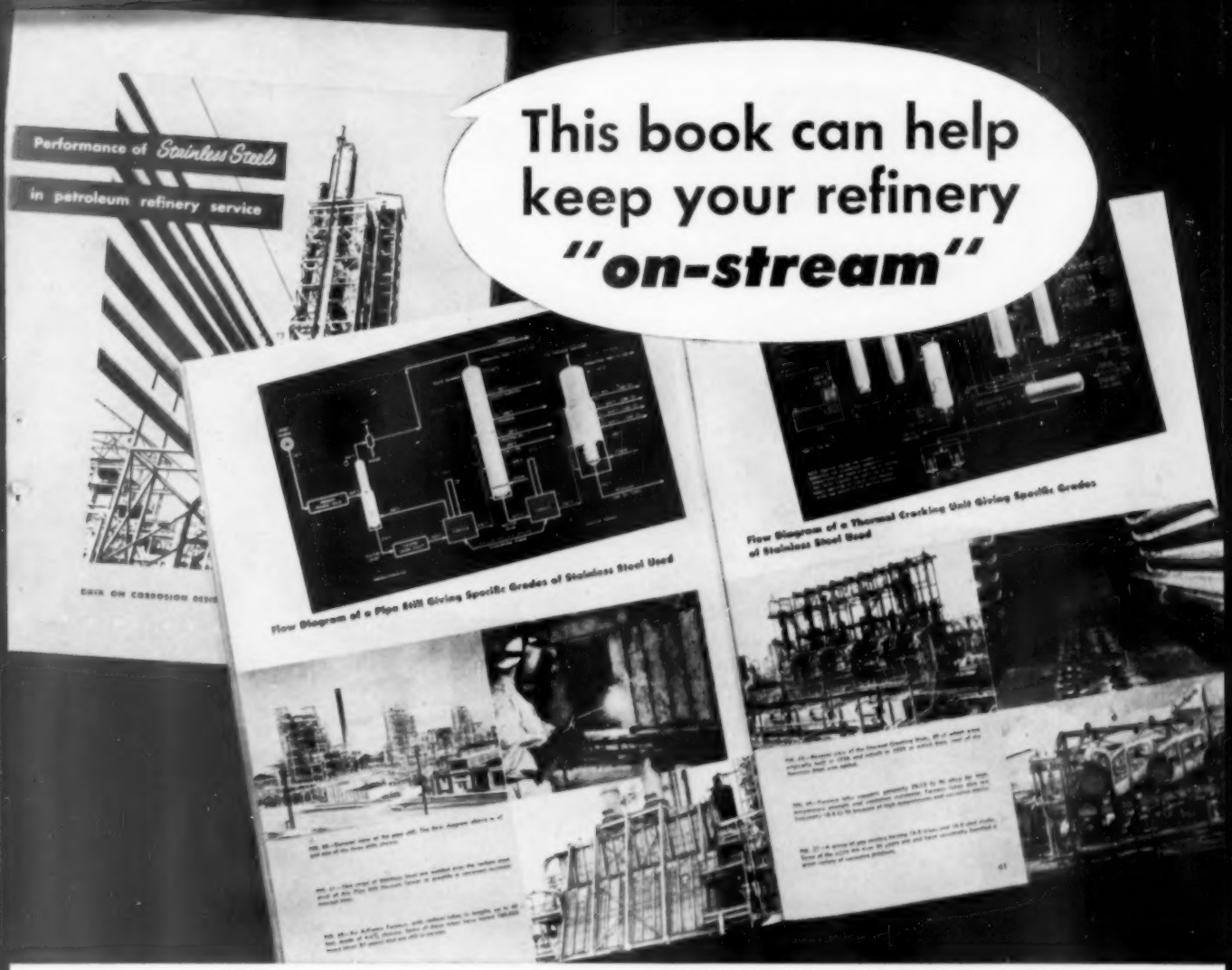
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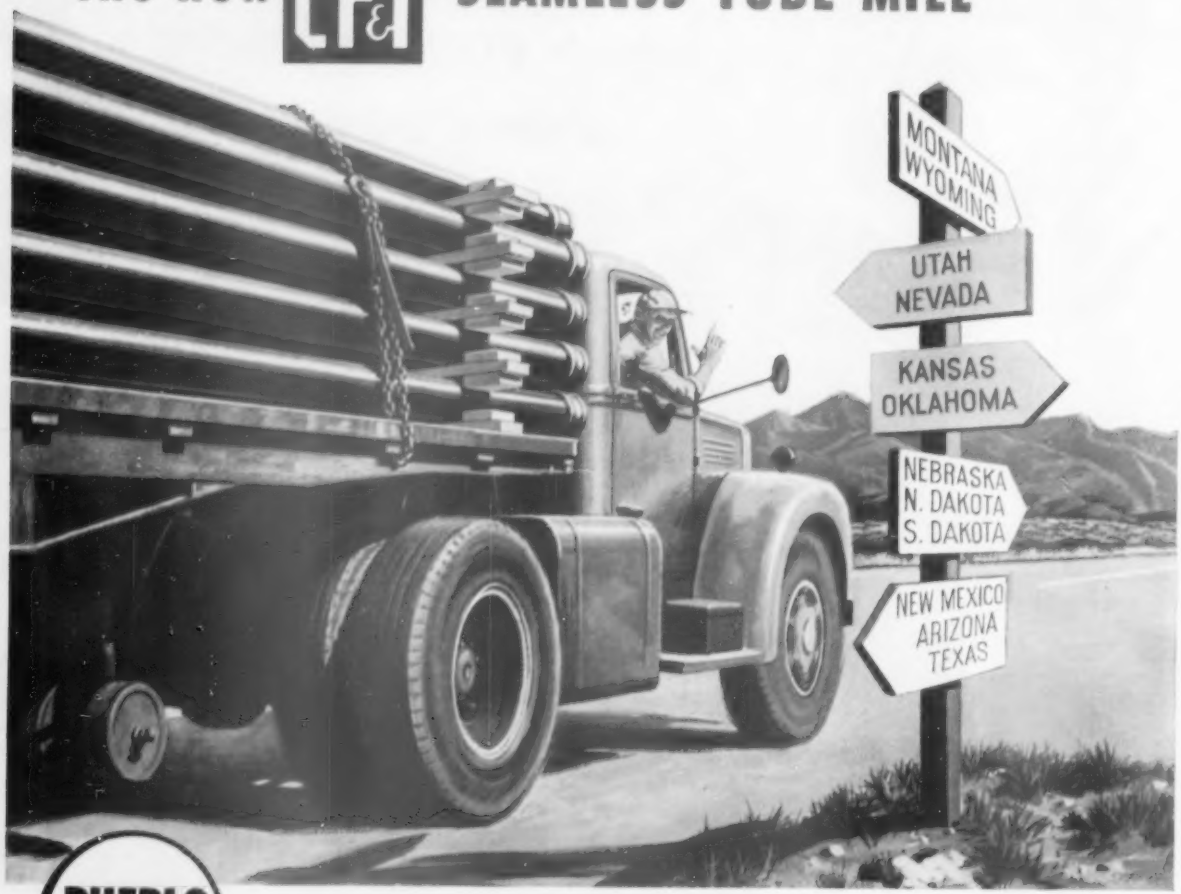

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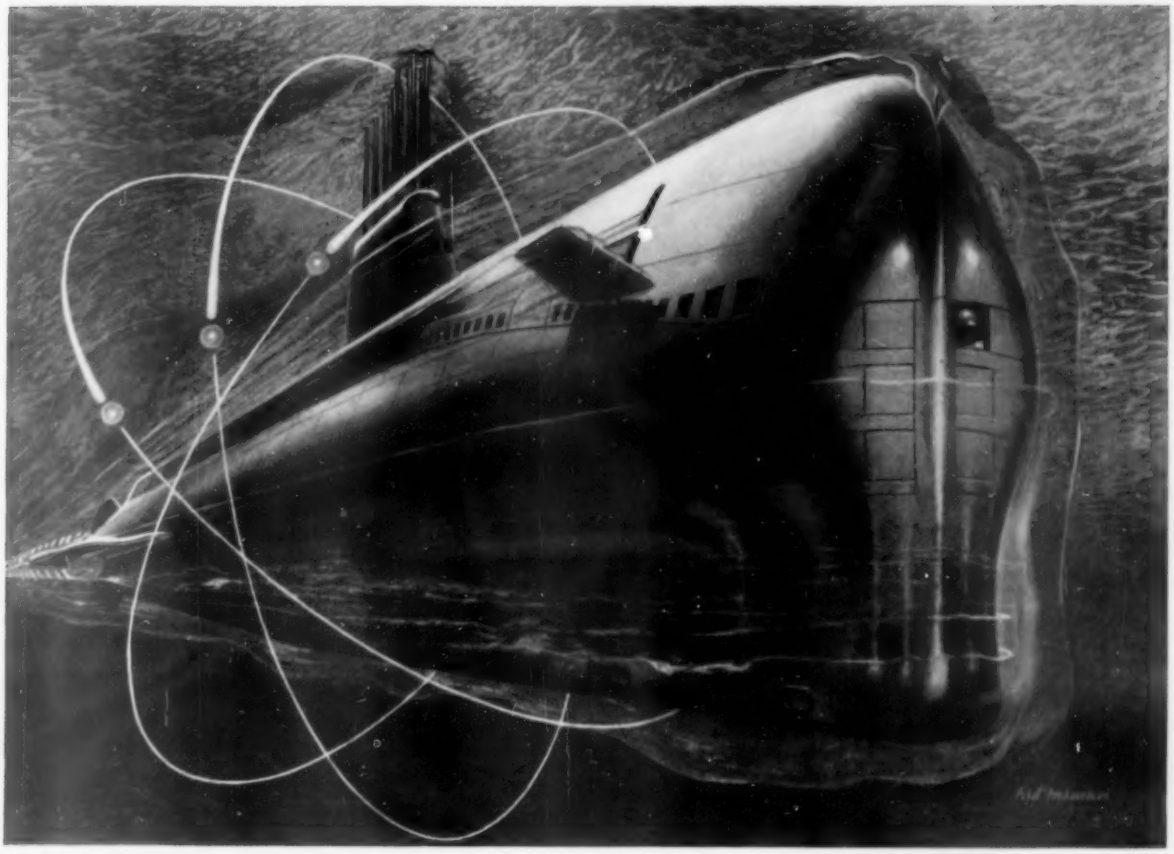

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A snorkel intake tube being machined to very precise tolerances on one of the large lathes in the Groton plant.

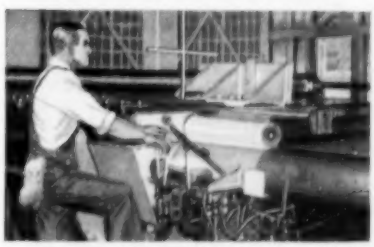
AFTER 54 years of building over 300 "conventional" submarines for the U. S. Navy and our allies, Electric Boat Division, General Dynamics Corp., marks its entry into the atomic age with the launching of the "Nautilus"—world's first atomic powered submarine.

Electric Boat, with its sprawling foundries and shops along the Thames River at Groton, Conn., is really many industries in one. It casts its own metals—both ferrous and non-ferrous. It shapes and machines metal parts—from thick armor plate to parts with microscopic tolerances. It has 27 overhead cranes, marine railway and land railroads, a fleet of trucks, low- and high-pressure compressors, its own Diesel power plant.

This wide variety of costly machinery represents almost every lubrication condition found in modern industry. That is why Electric Boat relies 100% on Gargoyle lubricants and a program of Correct Lubrication—has done so for 34 years.

* * *

You can give your plant, mine or mill this same unsurpassed protection. Just call your Socony-Vacuum representative.



Hydraulic bender shapes section of 8-in. steel pipe in two minutes. This operation formerly took a full day.

SOCONY-VACUUM *Correct Lubrication*

FIRST STEP IN CUTTING COSTS

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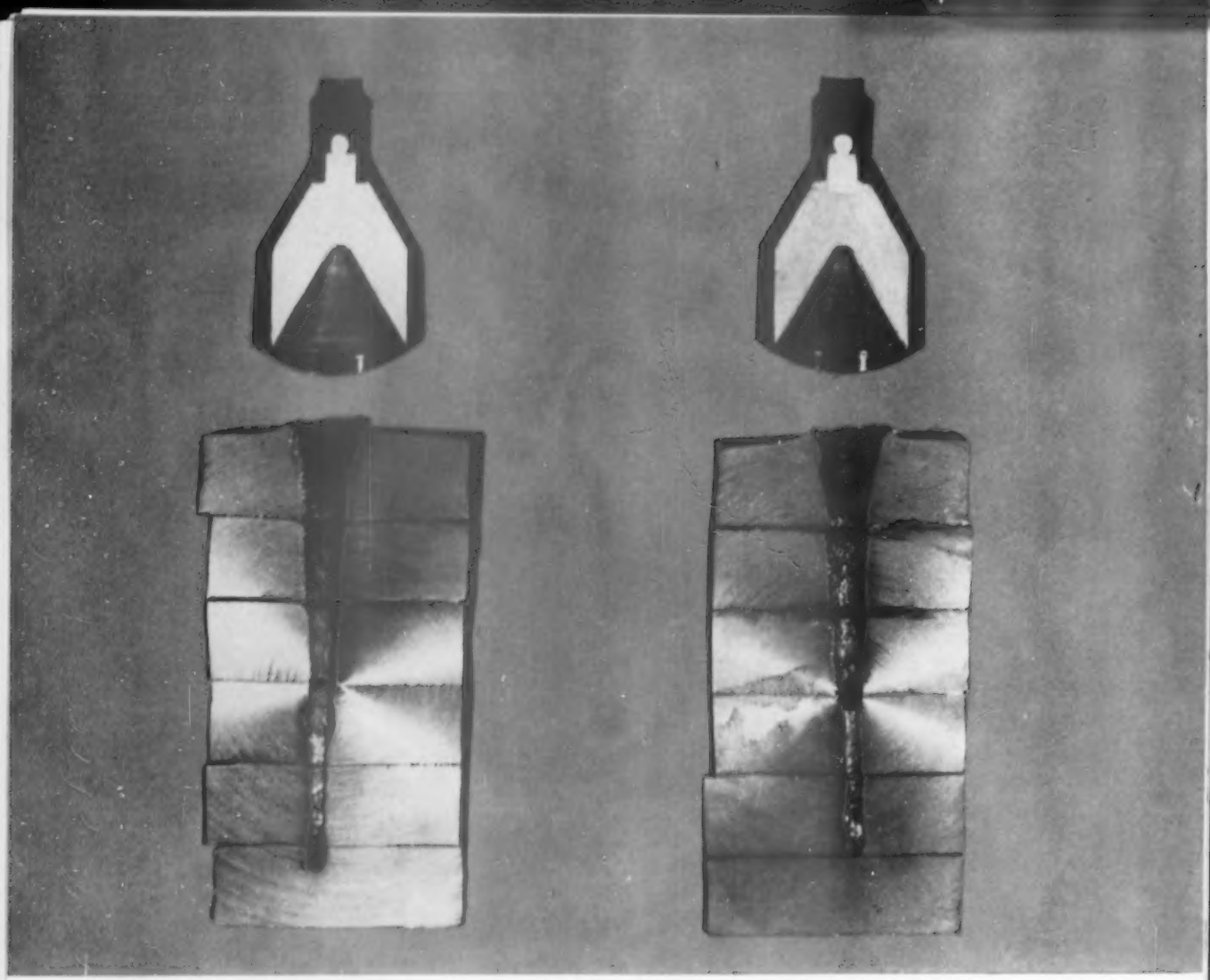

Why you get consistently deeper penetration with Du Pont Jet Perforators

Proper charge density was determined through research

Every factor that could influence the performance of Du Pont Jet Perforators was carefully tested before they went into production. One series of tests proved that—all other factors being equal—greatest penetration went hand in hand with greatest density of charge. Photograph above shows effect of high density (left) vs. slightly lower density (right).

This is only one example of how Du Pont research has developed Jet Perforators that can be counted on to give you the best possible results *consistently*. Every shot makes an effective hole, readily piercing up to three strings of casings and going well beyond the range of mud damage. Another advantage is that Du Pont Jet Perforators leave practically no burr in the casing . . . packers and other tools can be lowered through perforated zones without scraping. And Du Pont Jets keep their peak efficiency even at well temperatures over 300°F.

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JET PERFORATORS

Product of Du Pont Explosives Research

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. . . THROUGH CHEMISTRY

You can weld this pipe with a brush

That's the only tool it takes to make field joints with Republic Semi-Rigid Plastic Pipe. And all you use are some thinner and welding solution.

It's done in five easy steps. And five minutes after the joint is made, it can be handled for normal pipe laying. After setting for twenty-four hours, a well-made joint is stronger than the pipe itself.

The line can carry high paraffin crudes, sour crudes, salt water and raw gas, both sweet and sour. Or you can use it for any other flow line service within recommended pressure and temperature limits.

There's no question about saving time. It's just a matter of how much. Booklet No. 603 will give you all the facts about Republic Semi-Rigid Plastic Pipe, along with Republic's new Flexible Plastic Pipe for water lines. Write for it.

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SEAMLESS WELDING FITTINGS

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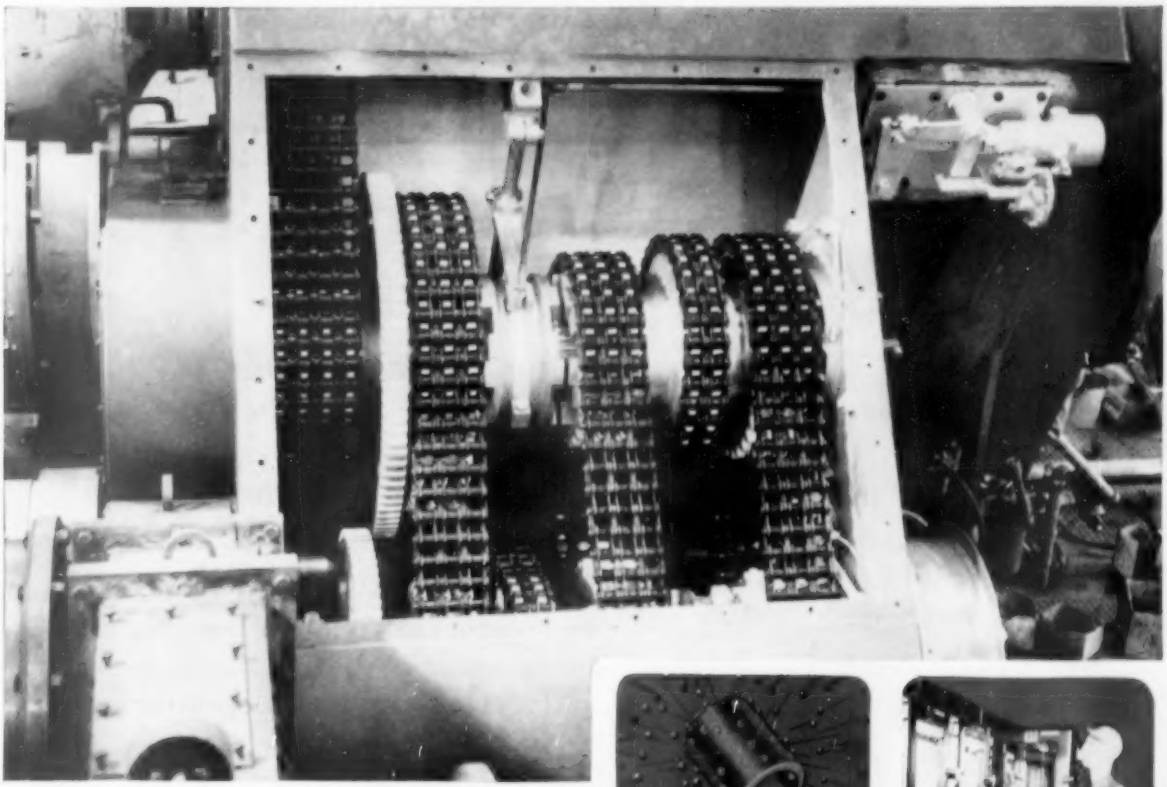
Producers of Globe seamless stainless steel tubes— Gloweld welded stainless steel tubes — alloy — carbon — seamless steel tubes — Globeiron (high-purity ingot iron) seamless tubes — Globe Welding Fittings.

How these Link-Belt EXTRAS* make roller chains last longer

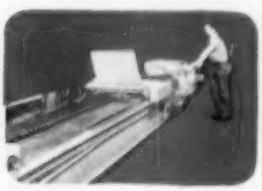


The new 1200 hp Brewster N-95 Drawworks dependably drills up to 14,000 ft. Link-Belt roller chain used exclusively by Brewster on this new rig.

SHOT-PEENED ROLLERS have greater fatigue life, added ability to withstand impact.

CLOSER HEAT-TREAT CONTROL, coupled with rigid testing, insures uniformity.

FASTER COUPLING and uncoupling of multiple-width chain with E-Z Assembly.



PRE-STRESSING of multiple width chain provides uniform load distribution.

*And you pay no premium for these LINK-BELT extras

THERE'S more to roller chain than just the parts you see. *Much more!* It's the hidden extras—standard on Link-Belt Precision Steel Roller Chain—that add up to longer life and lower costs.

Check the four extras shown here. Then for your drilling and other demanding power transmission jobs, choose from the complete line of Link-Belt roller chains and sprockets. There's full ordering and application information in 148-page Data Book 2457. Ask your nearby Link-Belt office or any leading supply store for a copy today.

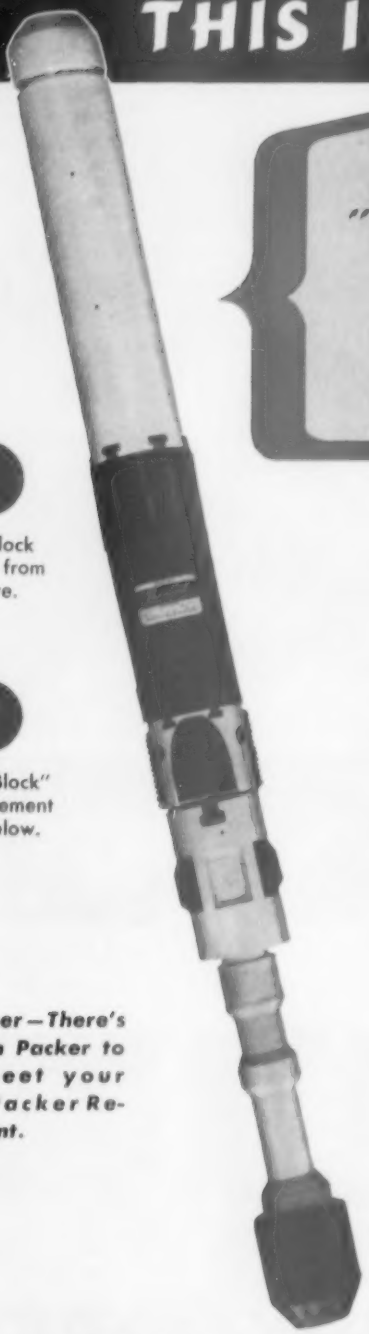
LINK-BELT

ROLLER CHAINS and SPROCKETS

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 1, Odessa, Tex., Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields.

IF THE JOB CALLS FOR A HOLD-DOWN PACKER

THIS IS IT . . .



The WILSON "Two-way" Metal Block HOLD-DOWN PACKER

1 Slips Block Element from Above.

2 "Metal Block" Blocks Element from Below.

Remember—There's a Wilson Packer to best meet your Every Packer Requirement.

Here is the safest Packer available today for Fracturing, Acidizing, Dual Completions and Injection wells.

The element is blocked at both top and bottom and cannot possibly cold-flow; you never rupture the casing; and it releases with differential in the tubing.

The Hold-Down device with its slips is made integral with the upper packer mandrel.

The opening through the entire Packer and Hold-Down Slip mandrel is full tubing size.

This is an outstanding development in Packer design and construction. It will save you time and money to run the Wilson Type "MB", Metal Block, Hold-Down Packer. See your supply store or write—

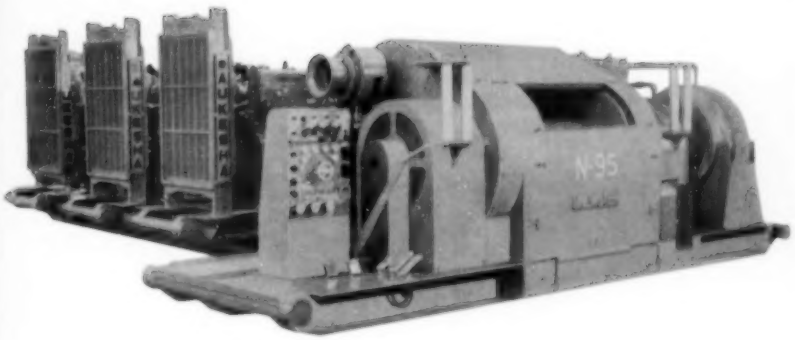
WILSON FOUNDRY & MACHINE CO.

1417 ELYSIAN ST.

HOUSTON, TEXAS

New Brewster N-95 Drawworks

Medium to Deep Drilling

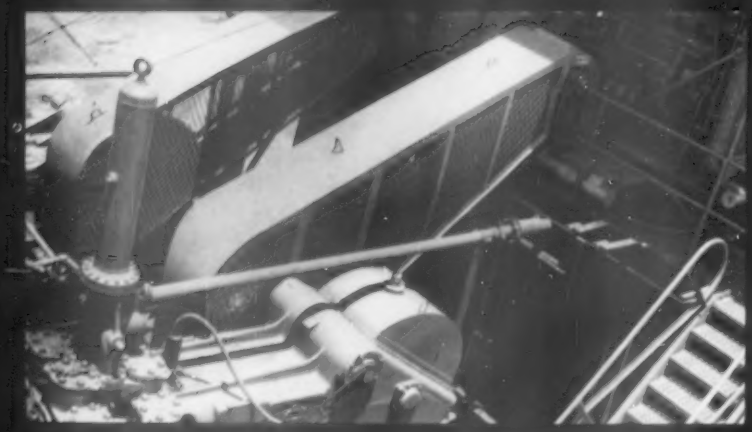


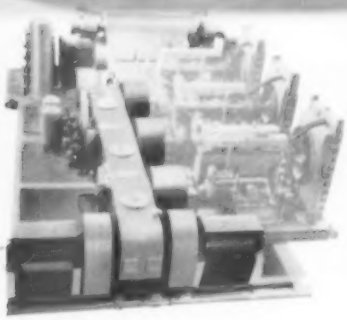
Built-in reserve power for competitive drilling from 8000 to 14,000'.

1200 HP

With more than 43 years experience in building fine drilling equipment, Brewster now offers the N-95 . . . combining medium-depth rig portability and fast operation with the "reserve power" and rugged strength needed for economical drilling of deep wells.

Brewster





RESERVE POWER FEATURES

Easy to move, single unit drawworks . . . controls, transmission, rotary drive and hydromatic brake mounted on main skid . . . moves as one load.

Largest main drum available in rig of this horsepower class 24" diameter x 50" length.

Eight evenly graduated forward speeds to main drum — 4 rotary speeds — one reverse speed.

Choice of direct mechanical, fluid coupling or torque converter drive arrangements.

Skid mounted heavy-duty box type compound, furnished for 3 or 4 engine drive.

Dual in-line pump drives at rear of compound for simplified rigging-up and manifolding.

Full-wrap 325 degree, circulating water cooled brake rims 46" diameter x 10" wide.

Filtered, oil pressure lubrication to all chains, bearings, and shafts in drawworks, transmission and compound.

A PROVEN RIG ALREADY IN THE FIELD . . . MAKING HOLE

SPEED DIAGRAM

Line Speeds and Pulls Based on 900 H.P./83.3 efficiency.

SPEED	LINE PULL LBS.	LINE SPEED-FPM
1	76,000	326
2	54,700	452
3	39,300	630
4	28,200	877
5	20,300	1,220
6	14,550	1,700
7	10,450	2,370
8	7,550	3,280

New Brewster N-95 Drawworks

for medium to deep drilling

THE N-95 retains all of the features that have given Brewster rigs a world wide reputation for simplicity, dependability and rugged strength, and has the added advantages of greater horsepower, bigger main drum and heavier construction for deeper drilling.

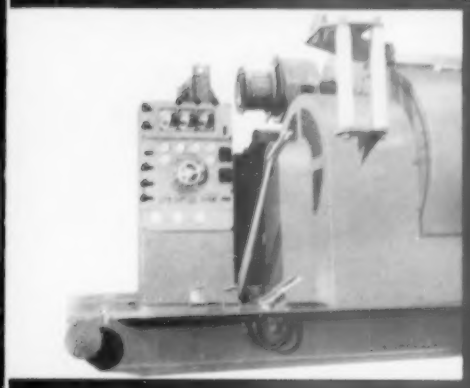
Compactly designed for easy moving, the N-95 is available with a wide selection of horsepower combinations and a choice of direct mechanical, fluid coupling or torque converter drive arrangements. This versatility provides the N-95 with economy of operation and maximum efficiency over a wide drilling range.

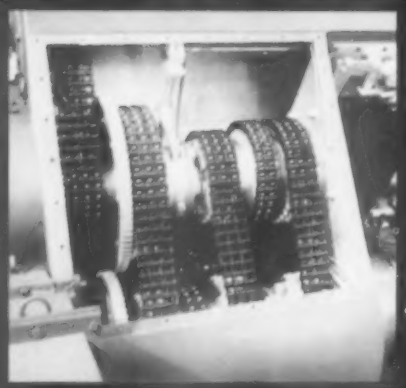
Built for profitable competitive drilling — THE N-95 HAS THE "RESERVE POWER" *to make low-cost hole in every formation.*

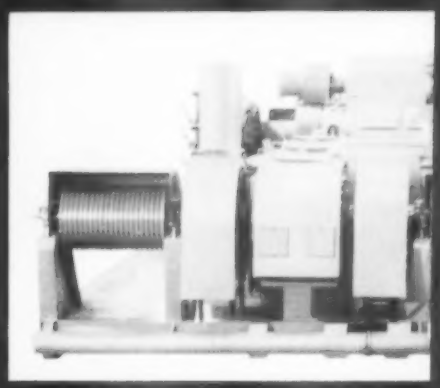
THE BREWSTER COMPANY, INC.

SHREVEPORT, LOUISIANA

BREWSTER DRILLING EQUIPMENT







SIMPLE POSITIVE CONTROLS

Finger-tip air controls mounted at the driller's station place every operation at the instant command of the driller. No rigid or universal-jointed connections are required between control panel and power units. Control panel moves "intact" with the drawworks package.

COMPACT TRANSMISSION

Transmission is compact chain type, delivering four speeds forward and one speed in reverse. Air actuated high and low clutches at the main drum provide eight forward and two reverse speeds for hoisting plus four forward and one reverse speed to the rotary.

DUAL PUMP DRIVES

Dual in-line V-belt pump drives at rear of the compound simplify rigging up and manifolding . . . eliminate the need for idlers or notching the substructure.

SUPPLY HOUSES - *Apex Equipment Company • Murray Brooks, Inc. • Reame Supply Company • Bovaird Supply Company • Industrial Supply Company • In Canada: Rocky Mountain Supply Company – Direct and through recognized export dealers.*

Auxiliary Drilling Equipment for the New Brewster N-95 Drawworks include the 300 Ton Traveling Block, 8-S Oilbath Swivel, and RSH 22" Oilbath Rotary.

BREWSTER RESERVE POWER RIGS

ECONOMICAL DRILLING

GRASS ROOTS TO 15,000'

10,000'- ON DOWN	**N-12**	1600 H.P.
8,000'- 14,000'	**N-95**	1200 H.P.
7,500'- 10,000'	**N-75**	750 H.P.
5,000'- 7,500'	**N-55**	500 H.P.
4,000'- 6,500'	**N-45**	350 H.P.
3,000'- 5,000'	**N-4**	300 H.P.
GRASS ROOTS 4,000'	**N-3**	145 H.P.

THE BREWSTER COMPANY, INC.

SHREVEPORT, LOUISIANA

They Say—

Asphalt Fan

Dear Sir:

Your editorial in the August 23 issue, "Sell More Oil by Selling More Roads," was a good one and very timely. The excellence of your editorial prompts me to compliment you, but at the same time I would like to express my keen disappointment in your not having referred to asphalt, undoubtedly the best and least-expensive component of concrete streets and highways.

The use of asphaltic concrete rather than portland cement concrete represents a saving of about 20 per cent in the construction of paved roadways. . . . The use of asphalt substantially increases the market for heavy crude oils for which prices have recently become lower. . .

R. L. Tollett
President
Cosden Petroleum Corp.
Big Spring, Tex.

Plenty of Natural Gas

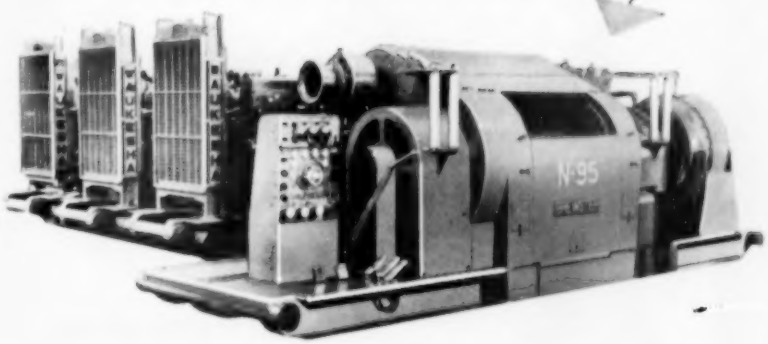
"Supplies of natural gas continue to increase at a rate greater than the ever-growing production of this important fuel. At the beginning of 1954, the A.G.A. committee on natural-gas reserves estimated proved recoverable reserves of natural gas totaled 211.7 trillion cubic feet. This was an increase of 11.7 trillion cubic feet over the previous year and the gain was made in the face of a record production of 9.2 trillion cubic feet in 1953.

"We need have little fear regarding ample supplies of natural gas for many years ahead.

"... The latest survey of gas utility companies shows we are adding new customers at the rate of better than 800,000 a year. It is estimated that approximately 1.2 million additional families will heat with gas during each of the next 3 years. Today there are more than 13 million homes heated with gas; nearly 51 per cent of all residential gas customers use gas for space heating . . ."

"One of the most fertile fields today

New 14,000 foot BREWSTER RIG is SKF equipped



Brewster Company's N-95 Drilling Rig provides the power for driving drill pipe 14,000 feet through the earth with maximum speed and efficiency.

It all adds up to a heavy-duty rig that must be dependable!

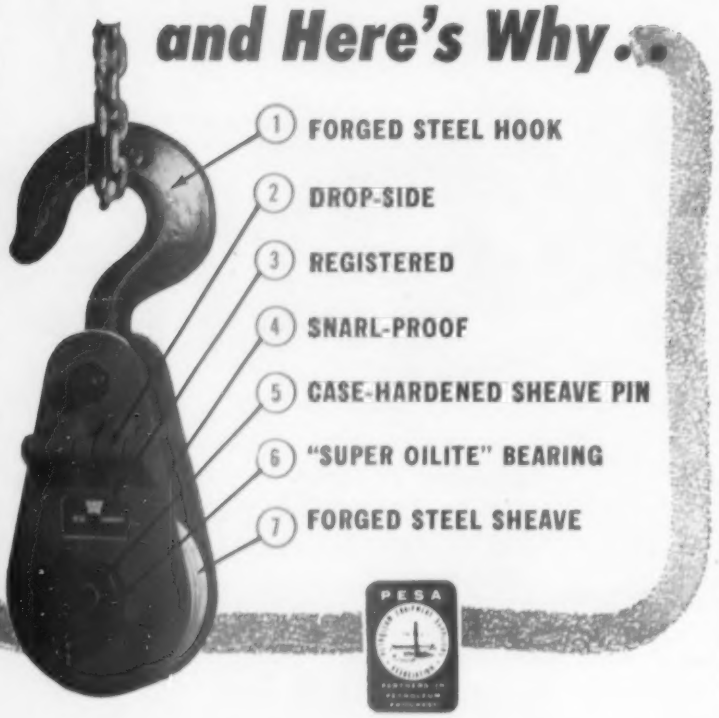
Contributing to N-95's dependability—keeping friction at a minimum—are seventeen SKF Spherical Roller Bearings—on the input and output shafts . . . rotary clutch and rotary counter shafts . . . drum and cathead shafts.

Whether you are designing new equipment or looking for replacement bearings, you can rely on SKF to *help you put the right bearing in the right place.* **SKF INDUSTRIES, INC.,** PHILADELPHIA 32, PA.—*manufacturers of* **SKF** *and* HESS-BRIGHT® *bearings.* 7571

SKF®
BALL AND ROLLER BEARINGS

WECO DROP-SIDE SNATCH BLOCKS

Your Best Buy and Here's Why..



These 7 great features assure superior service and performance. WECO Drop-Side Snatch Blocks are easy to handle . . . safer to use . . . have greater strength, safety and utility.

Sides are 3/8" steel plate. Hook or clevis is full swiveling. Wire line or manila rope cannot slip between sheave and side plates.

The patented WECO Drop-Side makes it easy to string or unstring the snatch block at any time. You just remove the wing-nut, raise the side, insert the line, drop the side and replace the wing-nut. Blocks are available in 6", 8" and 10" sizes.

Ask your Supply Store or industrial distributor for WECO Drop-Side Snatch Blocks.

It's wise to standardize with.. WECO

WECO®

WELL EQUIPMENT MFG. CORP. • Division of Chikvan Company • HOUSTON 1, TEXAS

is the gas air-conditioning field . . . I call it especially to your attention . . ."

Earl H. Eacker, president, American Gas Association and Boston Consolidated Gas Co., in an address at a Vancouver meeting of the Pacific Coast Gas Association.

Prices in Canada

"Against the average price of 40.3 cents for a gallon of Esso gasoline, you will pay an average of 88 cents for a gallon of milk; 60 cents for a gallon of distilled water; 80 cents for a gallon of coffee (if you make it yourself!); and $1.89 for a gallon of the largest selling soft drink in Canada . . .

"We are proud of the fact that gasoline—in this era of post-war inflation—has held the price line better than almost any commodity that can be named. The relative cheapness of gasoline is the result of competition throughout the industry which starts before the drilling bit grinds into the rock in search of oil, and ends when your local service station attendant fills your car's tank with Esso gasoline . . ."

Editorial in the August issue of Imperial Oil Review, monthly publication of Imperial Oil, Ltd.

Hopeful Hum in France

". . . Outside the little village of Parentis in southern France stands a derrick that may mark a major oil discovery by Jersey's affiliate, Esso Standard S.A.F.

"The quality of crude oil from the discovery well is very good—it contains a high proportion of gasoline and other light products. Esso Standard S.A.F. has obtained an exploration concession to an area of four million acres southwest of Bordeaux, and is speedily drilling new holes to evaluate the significance of the initial discovery.

". . . There is a hopeful hum of activity everywhere in the region . . ."

From the September issue of Briefs, monthly publication for stockholders of Standard Oil Co. (N. J.).

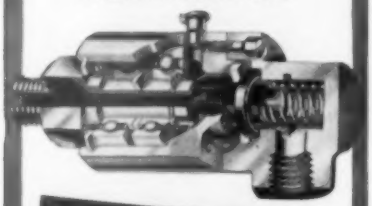
The Need for the Nonautomatic

". . . There never was and never will be any such thing as truly 'automatic' accounting or automatic-anything-else where judgment and intelligence are required. The human element becomes increasingly important as new machines and techniques broaden the scope and capacity of the individual. . .

"Human ingenuity originated every improvement made in a routine or procedure whether or not utilizing the electronic and mechanical marvels of our time. And they can only be successfully

REDUCE

"Down-Time" and Maintenance



Specify DEUBLIN ROTATING AIR UNIONS

For dependable, low-cost transmission of air from stationary to rotating machine parts, it will pay you to use Deublin Rotating Air Unions. Following are typical advantages engineered into these precision-built unions which combine to reduce "down-time" and save on maintenance.

✓ **LEAKPROOF AIR SEAL**
Hardened and lapped Graph-Mo tool steel running against a lapped carbon sealing face provides the best known air-sealing method.

✓ **NEW BALANCED SEALING**
Air is balanced within the unit so line pressures can not increase load on seal faces, thus increasing seal life.

✓ **MINIMUM TORQUE**
Starting and running torque held to constant minimum through balanced sealing and two single row, sealed-for-life ball bearings. This permits higher operating speeds.

✓ **DURABLE CONSTRUCTION**
Light weight, yet built for long trouble-free performance.

✓ **SIMPLIFIED MAINTENANCE**
Only the seal faces are expendable. Easily replaceable on the job.

✓ **OPERATING DATA**
Maximum speed, 3500 r.p.m. Maximum pressure, 150 p.s.i.

Ask your local supply store for details and prices.

Get the facts about the new Deublin CHATTER-PROOF Quick-Release Valve

DEUBLIN COMPANY
Precision Products for the Petroleum Industry
1133 Waukegan Road, Glenview, Illinois

carried out through the cooperative efforts of individual employes.

"We may keep the records on punched cards electronically controlled, but we still need the human touch and human intelligence. The machines will not think for us; they will not pacify an irate householder or explain the cause of a high bill.

So, here's to us human beings; may we never go out of style!"

"From Management's Desk" in the August issue of Safety Valve, monthly publication of Houston Natural Gas Corp.

CALENDAR OF EVENTS

SEPTEMBER

27-28 Symposium on Methods for Testing Liquefied Petroleum Gases (ASTM D-2; ASTM D-3, CNGA & NGAA), Statler Hotel, St. Louis.

27-29 Electrical Conference for Petroleum Industry, American Institute of Electrical Engineers, Mayo Hotel, Tulsa.

26-29 Ninth Annual Petroleum Mechanical Engineering Conference, petroleum division of the American Society of Mechanical Engineers, Statler Hotel Los Angeles.

30 Southern Gas Assoication, conference on transmission management, Shamrock Hotel, Houston.

OCTOBER

1 Southern Gas Association, conference on gas pipeline rights-of-way, Rice Hotel, Houston.

1-2 Standards Engineers Society, annual meeting, Haddon Hall, Atlantic City, N. J.

3-7 ASTM Committee D-2 on Petroleum Products and Lubricants, Sherator Park Hotel, Washington, D. C.

4-6 Petroleum Electric Power Association twenty-sixth anniversary meeting, Jung Hotel, New Orleans.

4-6 Air Pollution Control Association, semi-annual technical conference, Biltmore Hotel, Los Angeles.

5-6 Texas Mid-Continent Oil & Gas Association, annual meeting, Plaza Hotel, San Antonio.

5-7 American Institute of Electrical Engineers, Middle Eastern district, Abraham Lincoln Hotel, Reading, Pa.

6-8 Eighteenth Technical Conference on Petroleum Production, Pennsylvania State University, State College, Pa.

7-8 California Natural Gasoline Association, twenty-ninth annual fall meeting, Ambassador Hotel, Los Angeles.

7-8 American Institute of Mining and Metallurgical Engineers, Pacific Petroleum chapter, fall meeting, Biltmore Hotel, Los Angeles.

8-9 Gas Measurement Institute, Legion Hall, Liberal, Kans.

10-13 American Association of Oilwell Drilling Contractors, fourteenth annual meeting, Biltmore Hotel, Los Angeles.

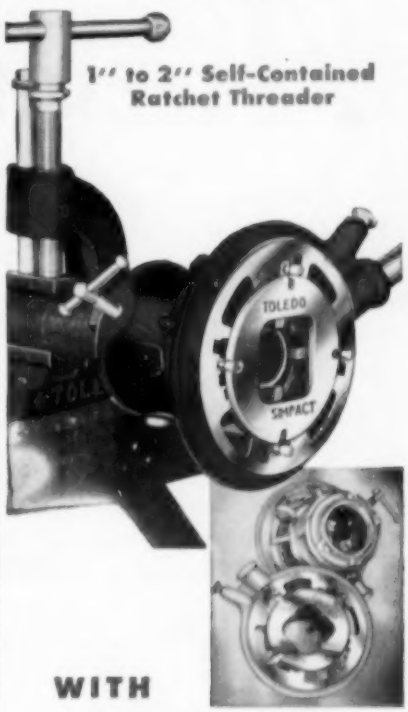
10-16 Oil Progress Week.

11-13 American Gas Association, annual convention, Atlantic City, N. J.

12-15 American Chemical Society, national meeting, Chicago Coliseum, Chicago.

NEW Improved TOLEDO Simpact

1" to 2" Self-Contained Ratchet Threader



WITH CAM-TYPE PIPE HOLDER

★ *Improved* cam-type quick-action pipe holder has broader jaws for more positive grip on pipe.
★ Free action cam assures instant setting to any size—1" to 2".
★ Easy to center . . . you get perfect aligned threads.
★ Fewer moving parts . . . minimum wear . . . light in weight. Amazingly compact . . . will thread a pipe projecting through a wall as short as 6¼".
★ Accuracy proven through the years . . . dies recede along tapered steps. A fine quality tool—yet low in cost! Write for new catalog. Order through your supply house. The Toledo Pipe Threading Machine Co., Toledo, Ohio.

RELY ON THE LEADER!

TOLEDO

PIPE TOOLS..POWER PIPE MACHINES..POWER DRIVES

FULL STOCKS AT J&L

AXELSON RODS

Many a man would wait as long as necessary for a string of Axelson Sucker Rods. There is no economical substitute for quality.

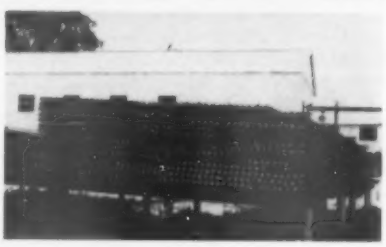
Rods normalized and heat treated from end to end *do* give better service.

It *is* important for the grain of the steel to take the direction of the load.

Rod ends *can* and *do* give trouble unless designed with the skill Axelson concentrates on such important details. Each rod is individually checked at each end with "Go", "No-Go" and "Standoff", and profile gages.

A rod straight to the eye may have inherent kinks and bends. It's good to know that in every Axelson Rod this was forestalled with a Medart Straightener in the bar stage.

SO WE HAVE GOOD NEWS for countless producers in the United States and Canada: Immediate delivery and Axelson quality are now reunited. J&L stores can deliver from stock.



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Serving The United States and Canada

12-15 Eighth National Chemical Exposition, Chicago Coliseum, Chicago.
14-15 National Association of Corrosion Engineers, South Central Region, Dallas.
14-17 Permian Basin Oil Show, Odessa, Tex.
17-20 American Institute of Mining and Metallurgical Engineers, petroleum division, fall meeting, Plaza Hotel, San Antonio.
18-19 Joint Lubrication Conference, American Society of Mechanical Engineers and American Society of Lubrication Engineers, Lord Baltimore Hotel, Baltimore.
21-22 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.
21-23 Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.
22-24 Golden Trend Oil Exposition, County Fairs Building, Pauls Valley, Okla.
24-26 Independent Petroleum Association of America, annual membership meeting, Mayo Hotel, Tulsa.
25-27 National Lubricating Grease Institute, annual meeting, Mark Hopkins Hotel, San Francisco.
26-28 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.
29 Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.

NOVEMBER

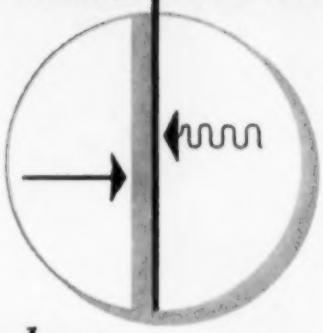
1-3 Geological Society of America, annual meeting, Statler Hotel, Los Angeles.
3-5 Gulf Coast Association of Geological Societies, fourth annual meeting, Rice Hotel, Houston.
4 American Association of Oilwell Drilling Contractors, third annual South Louisiana safety clinic, New Iberia, La.
4-5 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
5 Southern Gas Association, conference on field production of natural gas, Herring Hotel, Amarillo.
8-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.
11-12 American Association of Petroleum Geologists, Pacific section annual meeting, Biltmore Hotel, Los Angeles.
17-18 North Texas Section, American Institute of Mining and Metallurgical Engineers, and Production Committee of the North Texas Oil and Gas Association, symposium on secondary recovery, Wichita Falls, Tex.
18-19 National Association of Corrosion Engineers, fourth annual conference of western region, Hotel Biltmore, Los Angeles.
18-19 Society of Exploration Geophysicists, eighth annual midwestern meeting, Adolphus Hotel, Dallas.
28-Dec. 3 American Society of Mechanical Engineers, Statler Hotel, New York.

DECEMBER

2-4 Interstate Oil Compact Commission, winter meeting, Drake Hotel, Chicago.
2-4 American Chemical Society, Southwest Regional meeting, Fort Worth, Tex.
3 Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex.
12-15 American Institute of Chemical Engineers, annual meeting, Statler Hotel, New York.

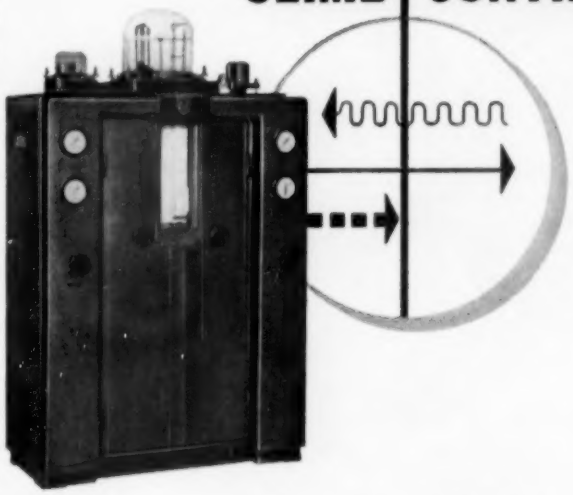
Where you need

HEAT | EXCHANGE



Be sure you have

SLIME | CONTROL



Whether you heat or cool water for make-up, process or any other use, you will need Wallace & Tiernan Chlorination to help combat slime problems introduced by water-borne bacteria or air-borne bacteria.

With slime control equipment designed for any need, built for lasting and dependable service, highly accurate and backed by over 40 years of successful application experience, Wallace & Tiernan Chlorination can help you increase the efficiency of your plant and cut operating costs. For further information write our Industrial Division.

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25 MAIN ST., BELLEVILLE 9, N. J.

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WHEN YOU *Specify*

Your SUPPLY STORE IS OUR DISTRIBUTOR

When you specify NORRIS, you are getting not only fine products — but also the benefit of years of experience of the Norris men in the field, whose job it is to work at all times with the PURCHASER AND THE SUPPLIER.

The men of Norris are located in all oil producing areas to assist you in the selection of the right equipment for your job. These men are a part of your staff. Their service to you makes the difference that classifies W. C. Norris as tops in its industry. Warehouse stocks are strategically located in areas that provide you, through your favorite supply store, with materials when and where you need them.

Norris men are at your service 24 hours a day, backed by a plant that has the most modern equipment and manufacturing skills acquired through 70 years' experience. When you order oil field supplies, whether sucker rods, polished rods, well heads, or tubular items . . . SPECIFY NORRIS through your supply store and take advantage of the extra service that is represented in the Norris sales and service staff.

W.C. NORRIS MANUFACTURER, INC.

TULSA, OKLAHOMA

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THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

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JOURNALLY Speaking

Drought Relief

WE'RE glad the summer is over. The drought has been tough on the oil industry. We've read half a dozen reports of how oil or gas pipeline companies strung emergency lines to carry water to parched communities —good public relations and good citizenship, but it interrupts their regular work. Likewise we've run across a flock of instances where oil was struck while drilling deep wells for water—and the irony of it is that water was so scarce and oil so plentiful that the landowners would have much preferred to find water than oil. And up around Mattoon, Ill., it was so dry that Carter Oil Co. had to use city sewage to operate a water flood—which could probably be classified as a double-barreled secondary-recovery project.

Progress in Competition

IT won't be long now until Oil Progress Week, and we note from the advance preparations that the theme this year is "Competition" and that dealers are being enlisted to take a more active part than ever. That seems quite appropriate. The current oversupply of petroleum, the attempts of refiners to reduce their inventories, the octane-and-additive race, and many local gasoline price wars ought to make dealers pretty well acquainted with the subject chosen as the theme. Back during the wartime rationing days and during the postwar scarcity periods it might have been, as many said, that businessmen had forgotten the meaning of competition. But it is now obvious that the oil industry, for one, has made great progress toward correcting that condition.

McIntosh Mystery

WE get the darndest mail. An oil man in Pennsylvania air-mails us a postcard asking "Just who is this fellow 'McIntosh'? We find his name represented in almost every state in the union." Maybe we're dense, but that doesn't ring any bells with us. We know that Kilroy was there, but we haven't caught up with McIntosh. Guess we don't get around enough.

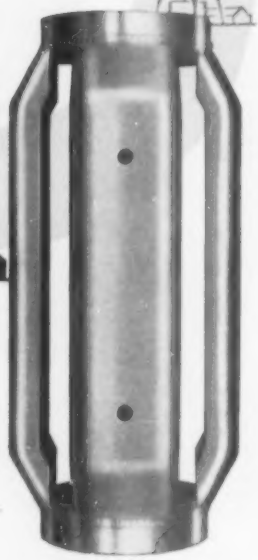
Notes from All Over

MAN in Long Beach wants his city to use its expected revenues from tidelands oil to rebuild the city as a colossal park . . . says success isn't measured by barrels of oil but by laughter of children. Among Oklahoma Indian lands recently auctioned for oil leases were allotments of Pearl Watchecoddy, Otto Tonips, Pahcoddy Pahcoddy, Ah-win-ah, Take-wah-poor, Hah-to-go, Martha Kome-sa-taddle, and Beatrice Eyelash . . . that last squaw sounds like a movie actress. Thieves in Oklahoma stole a complete drilling rig over one weekend, leaving nothing but the mud pit . . . it was painted fire-engine red, was too big to move on the highway, and made 10 truckloads when broken down . . . not a trace of it could be found . . . and yet most drilling contractors have more rigs than they know what to do with. Desk and Derrick girls seem to enjoy kidding themselves a bit . . . names of local club bulletins include The Catline, Petticoat Pipeline, Wildchatter, Patent Leather Pumper, Gal'N Oil, Quill & Drill, Swivel Squeaks, Top Pay, and The Oil Spouter. The Williston basin lease play has quieted down so much that you can now buy leases by mail order from a New York firm . . . 20 acres for $69, 80 for $225 . . . no wonder the lease brokers up there now call themselves broke leasers. Four thousand Los Angeles Boy Scouts got their geology merit badges and learned something of how the earth was put together from a geology counselor assigned to their camp for 10 weeks last summer . . . program was sponsored by A.A.P.G., paid for by 14 oil companies.

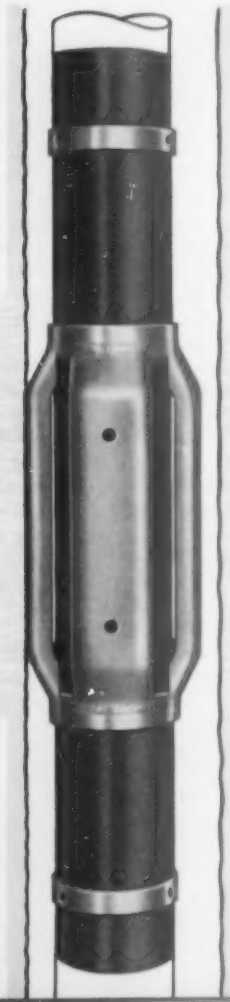
—Henry D. Ralph.

sooner or later you will want

BAKER rigid type CASING CENTRALIZERS



In line with the long established "Baker Policy" of furnishing the most efficient means of centering your casing, the new Baker RIGID TYPE Casing Centralizer is offered to supplement the outstanding Baker SPRING TYPE Centralizers.



Baker RIGID TYPE Casing Centralizer, Product 9131

CHOOSE THE "TYPE" YOU NEED

If your formations have a tendency to slough off, form cavities, or to wash out, you should continue to use Baker SPRING TYPE Casing Centralizers. The flexibility of the springs permits them to expand and compensate for these variations in hole size and still provide *maximum* centering force.

However, in harder formations, the Baker RIGID TYPE Casing Centralizer (Product No. 9131) is the one to use.

EASY TO INSTALL—POSITIVE CENTERING

The Baker RIGID TYPE Casing Centralizer normally is merely slipped over the casing and allowed to travel freely between collars. If exact spacing is desired, the Stop Collars are spot welded to the casing to prevent *vertical* movement of the centralizer, but to permit *free rotation* of casing while the *centralizer remains stationary.*

Baker RIGID TYPE Casing Centralizers are available to run on casing from 5½" to 9⅝" O.D., to center casing in well bores with minimum gauge from 7⅜" to 12¼". The inflexible "pads" ensure *positive clearance* between the casing and the wall of the open hole when casing is being cemented in harder formations.

FOR RIGID TYPE CASING CENTRALIZERS

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

FPC's view of the Phillips case is becoming clearer

THE general outlines of the Federal Power Commission's approach to regulation of gas producers are beginning to emerge from the confusion attending the issuance of its Order 174-A.

FPC doesn't like its "shotgun wedding" to the producing industry which the Supreme Court ordered in the Phillips case. It realizes that the Natural Gas Act, written for pipelines, is ill adapted to producers. It hopes Congress will amend the law, if not to divorce producers then to provide a more practical type of regulation.

It thinks the majority opinion of the court went far beyond the facts in the Phillips case, far beyond the Circuit Court decision which it upheld, and far beyond the intent of Congress. It holds that the court, not FPC, is responsible for producers' troubles.

BUT FPC WILL NOT SHIRK ITS DUTY. Producers, it holds, are subject to the act and its penalties no matter what FPC does or does not do. It believes Order 174-A actually helps producers by spelling out for them the minimum mandatory requirements of the law.

The act of selling gas into interstate commerce for resale, said the court, made producers subject to the law, and the law says that all subject to it must have a certificate from FPC and may not change rates or service without FPC approval. FPC sees no way around this. Whether or not producers will be able to show it a way out is a question.

It also remains to be seen how FPC will handle the thousands of individual applications now flooding in on it. Unless FPC assumes power to make blanket regulations, apparently each action by an individual producer will require FPC approval. But early decisions may set a pattern for handling hundreds of similar cases in routine fashion.

For example, on sales contracts containing escalation clauses, FPC may decide that once a contract has been approved by it, all price-increasing provisions may operate automatically without further approval.

OF DEEP CONCERN TO FPC is maintenance of reserve supplies of gas for a pipeline for the protection of both consumers and investors. For this reason it is not likely to sanction exercise of escape clauses in producers' contracts, even if a legal loophole for doing so could be pointed out by producers.

At the same time FPC recognizes that federal regulation may dampen producers' incentives and interfere with state conservation to such an extent that the desired reserve supplies will not be obtained.

It is this dilemma over supply that FPC considers the crux of the problem to be laid before the next session of Congress.

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ANCHOR will take it from here . . .

Contract to sell Anchor your surplus stocks, Anchor will take them from your plant in cars from Anchor's huge tank car fleet. If you wish to buy, Anchor will take needed petroleum products direct to your door, supply you dependably in any quantity. Anchor's vast underground storage facilities assure you of a place for your contracted butane and propane, or of a dependable reserve supply.

Anchor personnel on your team will give expert marketing and transportation service and help. So, if you have surplus Butane, Propane, Diesel Oil, Fuel Oil, Natural Gasoline, Naphtha, Kerosene or other Petroleum Products . . or if you want to buy these products . . . call ANCHOR PETROLEUM COMPANY, TULSA, Phone 2-7261.

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THIS WEEK... ...IN THE NEWS

NATURAL GAS—Eighteen attorneys representing 106 gas companies tell FPC it was way off base in issuing its Order 174-A. . . . Two-day hearing indicates companies will appeal to the courts if FPC refuses to withdraw or modify order. . . . Principal objections were to provisions regulating sale of gas. . . . FPC, lawyers argue, was given by the Supreme Court authority only to fix prices at which producers may sell to interstate lines. . . . No other powers can be read from decision, they declare. . . .

INTERNATIONAL — Australian oil fever spreads to Queensland as result of gas discoveries in two wells there. . . . Across the continent another wildcat is spudded, this one at Cape Range 25 miles north of Rough Range oil discovery. . . . ¶Meanwhile, in Northwest Australia operators are racing against time — and the approaching monsoon season—to get equipment moved in for more tests. . . . ¶Iranian oil settlement goes before the Majlis, lower house of Iranian Parliament, for ratification. . . . ¶West Germany increases its exports of oil products. . . .

EXPLORATION — Impending construction of Pacific Northwest line from San Juan basin to Washington spurs exploration in Utah, Wyoming, and Colorado along route of line. . . . ¶Shell has new field in open water 5 miles off tip of Plaquemines Parish, Louisiana. . . . Discovery is rated good for 215 bbl. daily of 31.9° gravity. . . . ¶Tests in dry basins of Dalhart and Raton in Texas and New Mexico indicate both may become producers. . . . ¶Texas Panhandle adds a new producing county and tests Permian gas production more than 20 miles from other Permian production. . . .

AUSTRALIA'S NEWEST WILDCAT on the Cape Range structure of the continent's extreme northwest coast is drilling below 3,000 ft. in Shothole Canyon. A venture of West Australian Petroleum, Pty., Ltd., the new well is 25 miles north of the Rough Range discovery well which started exploration all over Australia. The Cape Range structure is 50 times the size of Rough Range which gave Australia its first commercial discovery. **(See page 62).**

PRODUCTION—Railroad Commission reverses September action and cuts October allowable to 15 days to shave 49,629 bbl. daily from state's oil production. . . . ¶Commission asked to approve unitized water flood covering 1,000 acres of East Long Mott field. . . . Quintana Petroleum engineers say project would recover an estimated 2,570,000 bbl. . . . ¶First injection takes place in huge SACROC unit of Kelly-Snyder field of Texas. . . . Injection system for entire field has now been completed and engineers say injection can begin in 50 wells as soon as Railroad Commission approves allowable transfers of 139 wells in field. . . .

INDUSTRY—O. A. Knight, president of Oil Workers International Union, hints he's about ready to drop no-strike policy in negotiations. . . . Thinly-veiled threat precedes wage talks by National Coalition of Oil Unions. . . . ¶Company reports to Texas Railroad Commission indicate imports in the last quarter will be nearly 6 per cent above those for the last quarter of 1953. . . . ¶Standard of Indiana and Sinclair will build big ammonia plant utilizing hydrogen from cat reformers at Whiting and East Chicago, Ind., refineries. . . .

PIPELINES—Trans-Canada Pipe Lines signs 25-year contract to sell natural gas to Northern Natural Gas. . . . U. S. company agrees to take 100 million cubic feet daily beginning October 27, 1955, and to increase 50 million cubic feet daily in October 1956. . . . Canadian firm will build spur off its proposed Trans-Canada line to Minnesota border and Northern will build spur to connect from its station at Minneapolis. . . . Cherokee Pipe Line Co. announces plans to convert recently purchased crude line to products to carry jet fuel to U. S. Air Force base in Wichita. . . . Line would serve refineries at Ponca City, Okla., of Continental Oil and Cities Service, joint owners of Cherokee. . . . ¶Malco Pipeline, Inc., receives accelerated amortization for 91-mile, 6-in. products line from its Prewitt, N. M., refinery to Albuquerque. . . .

FPC Hears Its Order Challenged

- Long list of objections outlined by attorneys for 106 companies hard hit by controversial Order 174-A
- Principal complaints are on regulation of sales, but all segments of the order are brought under attack

Bertram F. Linz

WASHINGTON.—The Supreme Court decision in the Phillips Petroleum Co. case gave the Federal Power Commission authority to regulate the prices at which producers may sell natural gas to interstate pipelines but not the power to regulate them in any other way, the commission was told last week.

In a 2-day argument before the full commission last week some 18 attorneys representing practically all of the 106 producers who had filed applications for reconsideration of Order 174-A laid out a lengthy list of objections to the order.

Several times it was intimated that refusal by the commission to rescind or modify the order would lead to an appeal to the courts.

One ground for court action was indicated in the emphasis laid upon the charge that the commission had not acted on the earliest-filed petitions for review within the prescribed 30 days and thereby in effect had affirmed the order.

Scope questioned . . . Counsel for the producers challenged the apparent belief of the commission that Congress, in the Natural Gas Act, gave FPC a mandate to do all of the things laid down in its 174-A order. But the Supreme Court decision, it was argued, dealt only with the question of rate regulation.

All of the necessary regulation of producers' sales to interstate pipelines could be carried on under the provisions of Section 4(C) of the Natural Gas Act without any of the collateral controls imposed in the order, it was declared.

The many charges leveled against the order had first been outlined in the original petitions for reconsideration and were supported by a large number of briefs filed in advance of the argument.

All provisions challenged . . . A major charge was that Order 174-A was promulgated without notice and hearing, in violation of the Administrative Procedures Act, but practically all of the provisions of the order were criticized in detail.

The reporting requirements laid down by the commission were attacked on the ground that the collection of the information had not been referred to and approved by the Budget Bureau as required under the Federal Reports Act of 1942.

The October 1 deadline for the filing of applications for certificates to sell provided inadequate time for the study of hundreds of contracts held by some companies, some of which might not be required to be filed under the order, and many of the larger organizations will be unable to meet the deadline and have already requested extensions, it was said.

The prohibition against abandonment of service or facilities without authorization is inapplicable because most producers do not have any "facilities," the commission was told. Already, it was disclosed, at least one producer is continuing to sell gas under an expired contract although it is anxious to terminate the arrangement.

This provision has created conflict between federal and state authorities in another instance where a state commission has ordered that gas, now being sold to a pipeline, must be reinjected into the formation to maintain pressure. The producer has spent large sums in installing the necessary facilities, but finds himself unable to comply with the state's requirements because of the prohibition on abandonment of service.

Sales provisions attacked . . . Most of the argument before the commission revolved around the regulation of sales.

The commission's repeated suggestion that if producers succeeded in eliminating Order 174-A they might find themselves under the more rigorous requirements of Order 163 which applies to natural-gas companies was met head on with the contention the latter is not applicable because, in a court proceeding, the commission couldn't show it was intended to apply to producers when it was adopted.

The easiest way to handle the problem raised by the Phillips decision, the commission was told, would be to rescind the order and exercise jurisdiction over producers by cases challenging specific rates it feels are unjust and unreasonable.

All of the producers' contracts with the interstate pipeline companies are on

Stanolind Tests New Gasoline Plant

Midland Farms gasoline plant of Stanolind Oil & Gas Co. was placed on stream for the first time last week when test runs were started in preparation for regular operations about October 1. Initial operations will be only as a compressor plant with a daily capacity of 10,000,000 cu. ft. of gas. Absorption and distillation facilities may be added, and the capacity may be boosted to 15,000,000 cu. ft. daily. Compression condensate from the new plant will be pumped to Stanolind's jointly-owned North Cowden gasoline plant for fractionation. Residue gas from the new plant will be reinjected into the Grayburg formation of Midland Farms field rather than the Ellenburger as previously reported. The gas-injection program in the Grayburg is a temporary pilot program designed to develop reservoir data and to assist in evaluating possibilities for secondary recovery in this zone.

file in the commission, submitted to support the companies' applications for pipelines, it was asserted, and there is no necessity to require them to be filed again.

The filing now required, it was declared, involves situations where royalty owners, many not familiar with the gas industry and not aware of the commission's authority, will have to file applications covering their arrangements for the sale of their royalty gas.

Escalator clauses . . . One charge of invalidity was made against the order on the ground it attempts to treat price adjustments under present contracts and prices in new agreements as "changes in rate schedules" when, in fact, escalation clauses and provisions to cover tax increases are part of the initial price specified in the contract and there is no change in that price when those provisions are applied.

This is a matter that goes to the very heart of what the producers will get for their gas, their revenue for finding new reserves and their ability to supply the general public, it was asserted.

Since the Phillips decision, it was declared, producers have been fearful they will not be able to get the going market price under FPC regulations and are unwilling to sell. The question was raised as to why the commission is requiring producers to secure certificates for sale when it is vested with the responsibility for insuring an adequate supply of gas to consumers and is not likely to deny any such application.

Retroactive regulation . . . While there was no question of the commission's authority to regulate producers' prices, it was charged it acted without authority in attempting to regulate them retroactively by freezing prices as of June 7.

If producers' prices were legal on June 6, it was argued, they were equally legal June 8.

Second 174-A Hearing Set

WASHINGTON.—The second hearing under Order 174-A will be held October 28 by the Federal Power Commission.

A request from Signal Oil & Gas Co. for authority to sell natural gas to Cities Service Gas Co. will be heard along with a Cities Service request to build a 16-in., 15½-mile pipeline to move the gas from Signal's Carter County, Oklahoma, processing plant to its line in Garvin County.

Previously, the commission had scheduled a hearing on an application from Montana-Dakota Utility Co. and eight producers in Big Horn County, Wyoming, for expanded natural-gas facilities.

Cities Service and Signal have been granted temporary certificates covering the proposed construction, operation and sales. Oklahoma Natural Gas Co. and the Oklahoma State Corporation Commission have filed petitions to intervene.

Signal, which purchases casinghead gas in Stephens and Carter counties from about 150 producers, began operations at its Carter County plant last month. The proposed Cities Service line will pick up the gas at Signal's plant under a contract calling for an initial volume of 30,000 M.c.f. per day at an initial price of 12 cents per M.c.f.

GSA Buying Revamped

Directive exempting oil purchases from Buy American Act modified; new order limits waivers to 13 eastern states

WASHINGTON.—The General Services Administration has backed away from an April 5 directive issued by the Dallas office exempting government purchases of oil products from the Buy American Act.

Under a modified order, the exemption will apply only to GSA purchases in 13 eastern states and the District of Columbia. Residual fuel oil purchases in North and South Carolina, Georgia, and Florida, also will be exempt.

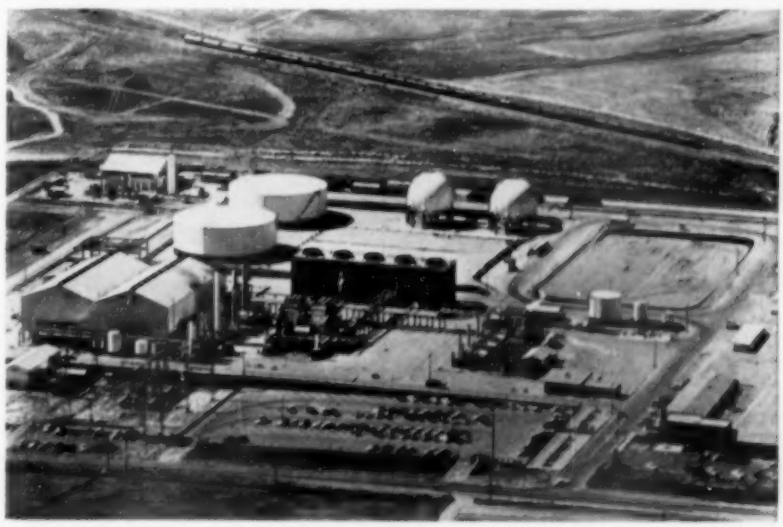
In all other parts of the United States, Alaska, Hawaii, and American Samoa, sellers under GSA contracts will be required to supply products refined substantially from domestic crude oil.

Who was fighting . . . The new order climaxed a vigorous fight by domestic producers, who were supported by some members of Congress. The producers demand the order be rescinded, or an explanation given for why it was necessary to exempt all oil products bought by the agency from the Buy American Act.

Nationwide purchases under GSA contracts are estimated at 111,800,000 gal. of fuel oil and 178,000,000 gal. of gasoline annually.

The domestic producers took the position that there are adequate domestic supplies to meet these needs. But oil jobbers contended they could not meet the requirements of the Buy American Act because foreign and domestic crude often is commingled to get products of desired specifications.

Rep. John Jarman of Oklahoma, threatened to seek a congressional in-



Brea Ammonia Output Tops 250 Tons Daily

Production at the new ammonia plant of Brea Chemicals, Inc., a subsidiary of Union Oil Co. of California, has reached more than 250 tons daily. Most of the output is marketed as a nitrogen fertilizer solution. A carbon dioxide plant is producing 70 tons of dry ice daily. An ammonium phosphate plant is under construction. The plant is located at Brea, Calif.

vestigation of GSA policies as result of the order.

Basis of modification . . . Modification of the exemption was based on a report from the Oil and Gas Division of the Interior Department that declared supplies of domestically-produced products are available to meet GSA needs except in the areas specified in the new order.

On the East Coast, however, it was found that more than half of the refinery products are made from foreign crude and the industry in that area followed the long-established practice of commingling foreign and domestic crude in both refining and distribution. Analysis of 1953 refining operations showed that 52.9 per cent of the crude run to East Coast stills was of foreign origin. On the West Coast it was 6.9 per cent and on the Gulf 0.4 per cent.

GSA Administrator Edmund F. Mansure said application of the Buy American Act to the East Coast would place an "unfair burden" on refiners and distributors due to the practice of mixing foreign and domestic crude "beyond ready identification." He added the act carries an exemption for such cases.

He added that if the foreign crude purchases were curtailed, the marketing pattern would be interrupted, resulting in undue expense in acquiring supplemental crude when needed.

A GSA report admitted the domestic supply is sufficient to meet the Government's needs, but said it would be "entirely impracticable" to fill Government requirements in 13 eastern states. These states are Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Delaware, Pennsylvania, Maryland, Virginia, and West Virginia.

The report added that the modified order exempting these states from the act will be altered "if the industry pattern should change so as to make it practicable."

Navy Bares Alaskan Data

WASHINGTON.—The Navy Department has opened all its well records and geophysical data on its Alaskan explorations to the public and has revealed that the Geological Survey is writing a technical history of the Survey's work there.

Twenty million acres of reserved land in Alaska is expected to be opened for oil and gas exploration as soon as the Navy has established the boundary lines of its Naval Petroleum Reserve No. 4 *(The Oil and Gas Journal, Sept. 20, page 142).*

The records and data are available for inspection and study at the Geological Survey offices in Washington and at the office of the inspector of Naval Reserve No. 4 in Fairbanks. The information will supplement the data compiled by the Geological Survey and released in May.

The Naval Reserve is located in a vast sedimentary basin north of Broos Range.

WATCHING WASHINGTON

Bertram F. Linz

Gas Producers File

Applications for certificates to sell natural gas to interstate pipeline companies are coming to the Federal Power Commission in a steadily increasing volume as the October 1 deadline approaches.

Most producers feel it is better to file and keep their legal standing intact than to ignore Order No. 174-A. Commission officials have said repeatedly this is not a punitive order, and they aim to be lenient. Nevertheless, they point out that producers who fail to file will be in violation of the Natural Gas Act and, technically, subject to fine or imprisonment. A fine of up to $500 for each day of violation is possible.

On the basis of last week's argument and the briefs filed, the commission will decide whether it will set aside or modify the order, but that decision need not come before October 1. If the commission stands by the order, any of the more than 100 producers who asked for the rehearing can ask for a court review.

A. F. of L. Hits Oil Policy

The American Federation of Labor held its annual convention in Los Angeles last week and blasted the administration for its oil policies.

Officials reporting to the convention admitted that bills recently enacted by Congress providing for construction of 20 tankers and authorizing the trade-in of old tankers for credit against the cost of new ships were steps to improve the maritime situation. But officials asserted these steps are inadequate to build up an adequate merchant marine.

Singled out for criticism was the failure of Congress to act on a bill designed to reclaim the oil-bearing tidelands, and its enactment of the bill exempting companies distributing natural gas within a single state from the regulatory provisions of the Natural Gas Act, which it was charged was "rushed through the Senate" without a hearing.

Offshore Battle Brews

Louisiana's claim to a 3-league boundary in the Gulf of Mexico, figured not from the low-water line but from headland to headland, is heading for a showdown.

Louisiana authorities have asked bids on leases on some of the same tracts of submerged lands that the Bureau of Land Management has listed for bonus sale October 13.

Nearly half of the 199 tracts offered by the federal Government are duplicated in the state's offer. The federal Government figures Louisiana's boundry is 3 miles from shore, while the state claims 10½ miles from a line drawn from headland to headland, which would carry the boundary out as far as 30 miles or more.

Interior Secretary Douglas McKay has not announced what action he will take on the state's claim. For operators interested in offshore development, it raises the problem of whether to offer bids to the federal or state government, or both, or to neither pending a court settlement.

The department and the state might enter into an agreement that leases issued by either will be validated according to any final court decision. However, this would not settle the problem if a federal lease was issued one company for a tract and a state lease issued another company for the same tract.

It is considered that Louisiana's action leaves it up to the department to initiate any court proceedings. This is easier than the state filing against the federal Government, which can be done only with the Government's consent.

Warren Heads Oil Studies

WASHINGTON. — J. Ed Warren, vice president of the National City Bank, New York, and former head of the Petroleum Administration for Defense, will head the oil and natural gas studies of the Cabinet committee on energy supplies and resources.

The coal studies will be headed by

Charles J. Potter, president of the Rochester and Pittsburgh Coal Co., and the combined survey will be under the direction of James F. Brownlee, New York financier.

The Cabinet committee was set up by President Eisenhower last July 30 to review the requirements and supplies of petroleum and natural gas, coal and synthetic liquid fuels. It is to submit its report by December 1.

Trade Pact Opposed

I.P.A.A. says GATT to tie U. S. hands on oil imports

WASHINGTON. — United States commitments under the General Agreement on Tariffs and Trade could nullify all efforts of the President's cabinet committee to solve the problem of oil imports, the State Department was warned last week by the Independent Petroleum Association of America.

In a brief submitted to the United States delegation to GATT which meets in Geneva, Switzerland, in November, the I.P.A.A. said participation in the agreement could tie the hands of the administration "morally if not legally" in dealing with petroleum import matters.

The cabinet committee is to submit recommendations to the President for a national fuels policy. Domestic producers hope the report will include restrictions on oil imports. The I.P.A.A. pointed out imports now equal about 15 per cent of domestic production compared to 5 per cent before World War II.

The delegation was told the agreement is objectionable on three major grounds:

... **A prohibition against import quotas** denies our Government the right to establish quotas even if they are the only effective method of protecting the domestic industry.

... **Freezing the life of individual tariff** concessions denies the United States the right to make changes in existing rates even though such change may be the only way to protect domestic industry. These provisions of the GATT agreement are contrary to the express mandate of Congress in the Trade Agreements Act which establishes the "escape clause" procedure.

... **The agreement binds the duty-free status** of natural gas imports. Only a limited amount of natural gas is now being imported into the United States. The I.P.A.A. contends rapid development of natural gas in other North American countries presents a potential import problem.

Imports Are Rising . . .

IMPORTS of crude and products in the last quarter will average almost 6 per cent more than in the last quarter of 1953, if company reports to the Texas Railroad Commission prove to be accurate.

These companies, which normally account for about 90 to 95 per cent of total imports, reported an average of 989,900 bbl. daily in the fourth quarter of 1953. The companies now indicate they expect to import 1,047,800 bbl. daily in the fourth quarter this year—a gain of 5.8 per cent.

Company reports for January 1953 totaled 1,051,300 bbl. daily compared with estimates for January 1955 of 1,144,300 bbl. daily for a gain of 8.8 per cent.

Total imports for the first half of this year were reported at 1,001,000 bbl. daily by the Bureau of Mines for a decrease of 2.0 per cent from the average for the first 6 months of 1953.

CRUDE AND PRODUCT IMPORTS*
(Thousands of barrels daily)

	1953	1954
October	905.7	992.1
November	1,019.5	1,062.6
December	1,045.4	1,089.1
Average	989.9	1,047.8
	1954	1955
January	1,051.3	1,144.3

. . . And Here's Where They Go

(Thousands of barrels daily)

	Actual*		Estimated or forecast				
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
CRUDE—EAST COAST:	1954	1954	1954	1954	1954	1954	1955
Atlantic Refining Co.	74.3	54.3	61.3	61.3	61.3	61.3	61.3
Cities Service Co.	7.3	14.3	11.9	12.9	24.0	31.3	11.3
Eastern States Pet. Co.	2.6	10.8	5.3	5.3	5.3	5.3	5.3
Gulf Oil Corp.	135.0	121.0	121.0	127.0	127.0	127.0	140.0
McBride Oil & Gas Corp.	....	....	6.7	6.5	6.7	6.5	6.4
Phillips Petroleum Co.	6.1	6.4	9.2	8.9	9.1	8.9	8.9
Sinclair Oil Corp.	62.8	67.2	66.0	66.0	66.0	66.0	66.0
Socony-Vacuum Oil Co.	89.2	89.6	89.0	86.0	80.0	80.0	80.0
Standard Oil Co. of California	67.5	75.0	72.6	72.6	72.6	72.6	72.6
Standard Oil Co. (Ind.)	16.3	13.3	22.4	10.1	10.4	6.7	6.7
Standard Oil Co. (N. J.)†	82.0	78.0	79.0	79.0	79.0	79.0	79.0
Sun Oil Co.	11.3	10.8	8.0	14.5	7.5	....	14.5
The Texas Co.	51.3	54.9	53.7	35.8	57.0	53.1	57.0
Tide Water Associated Oil Co.	....	9.7	12.3	16.2	6.9	14.6	6.7
Total East Coast	605.7	605.3	618.4	602.1	612.8	612.3	615.7
CRUDE—WEST COAST:							
Socony-Vacuum Oil Co.	....	....	....	....	26.5	26.5	26.5
Standard Oil Co. of California	24.4	22.3	16.2	16.2	16.2	16.2	16.2
The Texas Co.	22.8	9.7	11.4	9.8	10.2	9.8	10.0
Tide Water Associated Oil Co.	25.9	16.9	28.0	6.9	13.0	12.2	15.0
Total West Coast	73.1	48.9	55.6	32.9	65.9	64.7	67.7
Total crude	678.8	654.2	674.0	635.0	678.7	677.0	683.4
PRODUCTS:							
Asiatic Petroleum Co.	7.9	1.0	7.0	5.0	7.0	7.0	8.0
Eastern States Petroleum Co.	14.7	15.8	15.0	15.0	15.0	15.0	15.0
Gulf Oil Corp.	3.0	4.0	7.0	4.0	4.0	4.0	4.0
Shell Caribbean Pet. Co.‡	78.0	64.0	90.0	115.0	135.0	165.0	175.0
Shell Oil Co.	21.2	14.4	21.6	16.1	20.3	22.6	24.0
Sinclair Oil Corp.	2.5	3.0	....	....	....	....	....
Socony-Vacuum Oil Co.	9.6	6.9	8.4	8.4	8.4	8.4	8.4
Standard Oil Co. (Ind.)§	12.8	....	10.3	18.1	18.7	18.1	18.1
Standard Oil Co. (N. J.)†	102.0	109.0	111.0	172.0	172.0	172.0	200.0
The Texas Co.	3.2	....	....	3.5	3.5	....	8.4
Total products	254.9	218.1	270.3	357.1	383.9	412.1	460.9
Total crude and products	933.7	872.3	944.3	992.1	1,062.6	1,089.1	1,144.3
Bonded fuel included¶	76.0	51.9	75.8	59.1	60.7	60.7	64.1

*From company reports to the Texas Railroad Commission. †Based on quarterly estimates. ‡Imported by independent distributors. §Received through suppliers who can furnish either domestic or foreign oil. ¶Mostly duty free for bunkering ships in foreign trade.

Refinery Plans Revised

Plant to be built by Tide Water on Eastern Seaboard may have capacity of 130,000 bbl. of crude per day

NEW YORK.—Tide Water Associated Oil Co. is raising its sights in planning the new $75 million refinery for the East Coast.

D. T. Staples, company president, revealed crude capacity of the refinery may be boosted from 100,000 bbl. per day as originally planned to as much as 130,000 bbl.

A site for the new plant has not yet been selected and the company is considering several. It is considered a certainty, however, that it will be located in the Delaware Valley area, probably in the State of Delaware.

From all indications the new refinery will rate a number of superlatives. It will be a fuel products plant. Tide Water will not continue the present manufacture of basic lube stocks at the new location.

The most modern conversion processes are under consideration, including a fluid catalytic cracking unit which will have a total feed capacity approaching 50 per cent of crude charging capacity. Catalytic reforming, light hydrocarbon recovery, polymerization and catalytic hydrogenation facilities are known to be under consideration, with the apparent aim of placing Tide Water in the front ranks on gasoline octane and other product qualities. The plant will be designed to afford future expansion as markets demand. It is probable that the refinery will be capable of producing a high yield of gasoline including a premium fraction on the order of 100 octane.

Even if a site is obtained before the end of this year and construction begins in 1955, the huge plant will probably not be in operation before 1957. Engineering is proceeding under a contract signed early this summer with C. F. Braun & Co. of Alhambra, Calif. A construction contract has not yet been let.

Tide Water will beef up its marketing structure on the East Coast to handle the increased output of the new plant. If present plans hold, the company's crude capacity on the East Coast will be increased about 40 per cent. Without lubricating oil facilities, and employing the higher efficiency of modern units, the plant will produce an even greater percentage increase of gasoline and distillate fuels.

Imported crude charge . . . The new refinery will be designed to handle sour stocks and will probably process a fairly high percentage of imported crudes. Tide Water has been increasing its imports in recent months, although they are still very small by comparison with receipts of other importing companies.

A half interest in production from the Neutral Zone between Saudi Arabia and Kuwait is held by the affiliated Pacific Western Oil Corp. To date, production from the Wafra field is relatively limited, averaging about 30,000 bbl. per day. Most of Pacific Western's share is coming to the United States as Tide Water imports.

During the last half of 1954, Tide Water imports to the East Coast will average about 9,500 bbl. per day of which 5,000 bbl. per day will be Wafra crude. The remainder will come from Saudi Arabia, Kuwait and Venezuela. West Coast receipts for the same period are estimated at about 18,400 bbl. per day of which 7,000 bbl. will be from the Neutral Zone, a like volume from Sumatra and the remainder from Qatar.

If Neutral Zone developments should parallel those of the two neighboring states, its production may eventually provide an important source of crude to be run to stills in the new refinery. In the meantime, the company will be capable of processing a wide variety of sweet and sour stocks from domestic and foreign sources.

Bayonne coming down . . . While new refinery plans are going ahead with all possible dispatch, the company faces a painful decision concerning its present refinery at Bayonne, N. J. A number of reasons ruled out Bayonne as the site for the new facilities. Furthermore, the company has declared that the present refinery is so outmoded and inefficient that it cannot be continued in operation until the new facilities can be built.

Operations are being steadily curtailed and it appears that the refinery will be substantially shut down in the near future. To supply its fuel needs on the East Coast, Tide Water has signed processing agreements with Gulf Coast and East Coast refiners. These are understood to include Pontiac Refining Corp., Southwestern Oil & Refining Co., and Sinclair Refining Co.

Bayonne example . . . It is generally conceded Tide Water had little choice in closing out Bayonne. Its abandonment was dictated by hard economics. The refinery is crowded into 236 acres, and the new plant will require at least 750 to 1,000 acres.

Bayonne processing facilities were designed mainly for sweet crudes and could not economically be revamped for future charge stocks. Units are outmoded; no new additions except a crude unit and some lube processing facilities have been added since the war.

As a result, the plant has been operating at a loss, and according to some company representatives, a sizable one. On labor costs alone, it is estimated that the new refinery, with nearly 140 per cent of the present plant's capacity, will be operated with about 35 per cent of the Bayonne payroll. This reflects both the higher efficiency of new facilities and the abandonment of lube oil and wax manufacture.

The onus for allowing Bayonne to become outmoded, cannot be laid entirely at Tide Water's door. For several years the company has been subjected to a squeeze play which prevented Bayonne's continued modernization and expansion. While the company kept pace with the times in its Mid-Continent and West Coast refineries, it was prevented from building at Bayonne by what it regards as an unreasonable local tax burden.

The consensus among Eastern refiners is that the city fathers of Bayonne are largely responsible for killing the goose. In the earlier days of refining, Bayonne appeared to be the logical center for East Coast refining. But, a deteriorating tax and labor climate appears to have repelled prospective new refiners and driven away those who had already located there. Today, one refinery remains in what was at one time a principal processing center on the East Coast.

Termination plans . . . A termination program announced August 10, is now effective for personnel not represented by the independent union, Employees Association of Bayonne. While the union has not yet accepted the terms of the program, the company has said that it has gone as far as possible in adopting the union's points and sincerely believes the program to be fair and generous.

Under the program, all employes

who are eligible for retirement will be retired. In addition, those 55 with at least 20 years of service may elect early retirement at a reduced allowance.

Remaining employes will receive separation allowances in lump sums, amounting to a graduated percentage of weekly pay multiplied by years of continuous service. The percentage ranges from 40 per cent for employes with 1 to 10 years of service to 50 per cent for those with over 25 years.

The company holds out no false hopes of temporary lay-off with rehiring at the new refinery. However, in a letter to employes, H. A. Jackson, company vice president stated, "If the company completes the construction of a new refinery on the Eastern Seaboard prior to April 29, 1959, it is the company's desire and intention to give preference in the filling of available jobs at such refinery to those former employes . . . whom the company determines in its discretion to be qualified and suitable to fill such jobs." Sidestepping of seniority and the amount of separation pay offered are the union's main objections to the program.

Ammonia Plant Due

New unit will be largest using reformer hydrogen

HAMMOND, Ind.—Standard Oil Co. (Ind.) and Sinclair Refining Co. have teamed up to build one of the largest ammonia plants in the Midwest—the fifth to be based completely or partially on reformer hydrogen.

The plant, to be built near Hammond, will utilize by-product hydrogen from catalytic reformers at the companies' Whiting and East Chicago, Ind., refineries. It will synthesize 300 tons of anhydrous ammonia per day and also will produce nitrogen solutions and ammonium nitrate.

The plant will be owned by a new company to be formed by the parent firms. Standard will supervise construction and will operate the plant under contract with the new company.

Bids are now being obtained from contractors, and site preparation is scheduled to start late this fall. Construction is due to start next spring. Completion is expected late in 1956.

Largest of its kind . . . The new plant will be the largest to be based on reformer hydrogen. The tail gas will be piped to Hammond, where hydrogen will be separated in a low-temperature fractionating unit. Nitrogen will be separated from liquid air in a similar unit.

Hydrogen for the new plant will be supplied by three reformers. Sinclair is now building a 16,000-bbl.-per-day unit employing its RD-119 platinum catalyst. Standard has a 14,000-bbl. fixed-bed Hydroformer and is building a 30,000-bbl. fluid Hydroformer at Whiting.

These three units will yield up to 23,000,000 cu. ft. of hydrogen daily.

Growing importance . . . The growing synthetic-nitrogen industry is relying more and more on reformers as a new source of hydrogen. The four previously announced ammonia plants to use reformer hydrogen will have a total capacity for producing about 515 tons of ammonia per day from reformer hydrogen.

The first such plant was Atlantic Refining Co.'s 100-ton-per-day unit recently completed at Philadelphia. Standard Oil Co. (Ohio) has let contract for a 300-ton-per-day plant at Lima, Ohio, which will fill part of its hydrogen requirements from a reformer at its refinery there.

In addition, Shell Oil Co. is expanding ammonia facilities at Pittsburg, Cal., to utilize hydrogen from a reformer at nearby Martinez, and Dow Chemical Co. of Canada is expanding ammonia production partially based on by-product hydrogen.

Drilling Tool Proved

Field use of recording sub indicates force of bit against rocks determines drilling rate, Instrument Society told

G. L. Farrar

PHILADELPHIA.—Field trials have proven the value of a new downhole instrument which accurately records stresses, temperature, pressure, vibration, and other measurements important to the driller.

A special virtue of the new tool is that it charts the information without loss of rig time during drilling operations.

The first detailed description of the new instrument was presented here before the first International Instrument Congress and Exposition by Carl R. Canfield, manager of the instrument department of Borg-Warner Corp.

The instrument is a nine-channel recording oscillograph, assembled as a drilling sub. It fits into the drill string just above the bit. *(The Oil and Gas Journal, February 15, page 94.)*

Results indicate that drilling rate is probably determined by the actual amount of force with which the drill hits the formation. "This is far different from the weight on the bit as measured on the drilling floor," Canfield said. Measurement of the force can be made over very short periods of time, and the effect of drilling-mud pressure on this force can be readily determined, he said.

The sub can be used also as a logging instrument with records taken every time the bit is changed. The speed of

SOME 20,000 PEOPLE viewed exhibits during the first International Instrument Congress and Exposition in Philadelphia's Convention Hall. More than 575 exhibitors used about 90,000 sq. ft. of space to display new instruments.

the oscillograph chart paper can be adjusted to take readings over very short time intervals. For example, Canfield said, it is possible to measure the hardness of the formation every 30 seconds.

Instrument construction . . . The sub is built to provide a 5-in.-square instrument cavity 30 in. long.

The walls contain tubular sections which can carry mud at a rate of 700 g.p.m. at pressures greater than 2,000 psi.

The basic elements of the recording system are a nine-channel recording oscillograph; a matching network for integrating galvanometers; an oscillator to provide timing marks at 1, 1/10 and 1/100 of a second; a nine-channel a.c. bridge balance; a program sequence timer; a power supply for the bridge of 3, 6 and 9 volts and a 24-volt d.c. power supply for the recorder and sequence timing motor.

Power to the recorder and timing oscillator is supplied from silver wet cells with a capacity of one ampere hour. Power for the bridge circuits is supplied from small mercury cells.

The many wires servicing the nine-channel recorder are carried in narrow grooves milled down the length of the tool. The wires are insulated and potted in resin. The potting is carried to within 6-in. of the end of each section in the laboratory. The final make-up and potting of joints is done in the field after assembly on the rig.

Mounting the instrument sub directly above the bit allows measurement of torque to the bit and compressive load on the bit by use of strain gages fixed directly to the sub structure.

The program sequence timer is initially started by use of a pressure actuated switch mounted on the instrument cavity cap. When drilling starts, the surface mud pumps can be surged to close the starting circuit. After a predetermined number of recording cycles, a second switch in series with the first switch opens, shutting down all circuits in the instrument.

Court, FPC Denounced

Louisiana-Arkansas group of Mid-Continent Oil and Gas Association asks Congress for natural-gas legislation

Henry D. Ralph

NEW ORLEANS. — The producing end of the gas industry cannot exist half free and half slave, and the American people must decide whether they want the gas industry to be competitive or be operated by the federal Government, Rex G. Baker told the Louisiana-Arkansas Division, Mid-Continent Oil and Gas Association, here.

Baker, general counsel of Humble Oil & Refining Co., denounced the Supreme Court decision in the Phillips Petroleum Co. case and the subsequent Order 174-A of the Federal Power Commission making sale of gas for interstate commerce subject to regulation under the Natural Gas Act.

The association adopted a resolution urging Congress, "at the earliest possible moment, to pass legislation that will definitely clarify the authority of the Federal Power Commission as it pertains to the production of natural gas, to the end that the historic position of free and competitive action of such producers be clearly confirmed by law." The association is the third such group to demand congressional action in the past 2 weeks *(The Oil and Gas Journal, September 20, pages 132, 134)*.

As the result of the Phillips case, Baker told the association, producers of natural gas are the only persons in the United States engaged in a competitive industry and not performing a utility function whose prices are subject to regulation by the federal Government.

NEW PRESIDENT of the Arkansas-Louisiana division of Mid-Continent Oil and Gas Association is L. Lee Welch of Vincent & Welch, Lake Charles, La.

"It seems quite clear that the American people are facing a very serious problem in this matter of prices at which producers may sell gas in interstate commerce. It is pertinent to inquire what the American people want.

"Do they wish to allow gas producers to operate in a free competitive economy and to permit the producers' prices to be determined by competition? Or are they content to permit the Federal Power Commission to regulate producers' gas prices in such a manner as not to reflect market conditions and to face the practical certainty of shortages, rationing, or subsidies?

"Would they like for the federal Government to take over, own, and operate the gas-producing industry? If so, do they wish to pay the producers for the gas reserves which may be taken over by the Government, or do they wish either in whole or in part to try the Mossadech approach of confiscation? Confiscation did not produce oil in Iran and will not produce gas in America.

"It seems quite clear that the American people will have to make their choice. Shall we have a free producing industry operated through the gas producer, or shall the federal Government take over in one way or another?"

Beyond congressional intent . . . Baker said the Supreme Court's dictum in the Phillips case went beyond the intent of Congress and beyond the facts in that case. As a result, the Federal Power Commission is thrust into the role of regulator against its will. However, he added, the FPC has gone further than it needed to in regulating gas producers. It should have withheld action until the Supreme Court acted on the pending petition for rehearing the Phillips case.

A way by which the commission could keep the industry competitive without surrendering its regulatory function was suggested by Baker.

"The commission is not bound to use or apply any particular formula," he explained. "The statute merely requires that any rates in effect be just and reasonable. The commission could, therefore adopt the policy of recognizing competitive rates as being just and reasonable and go no further than to satisfy itself that the rates provided for in the contracts are competitive prices and have been arrived at as the result of good faith, arm's length bargaining between willing sellers and willing buyers.

"Such a policy, if adopted by the commission, would have the virtue of being just and reasonable and easily administered.

"The interstate transmission lines are able to drive hard bargains, and these

redound to the benefit of the consumers. The commission should accept or recognize these competitive prices.

"It would not be just and reasonable for the commission to attempt to determine producers' prices by the rate-base method. The inefficient would receive high prices and the efficient would realize only low prices. Every producer would have a price different from all other producers.

"No federal agency, not even the Federal Power Commission, is wise enough to adopt any formula or program for regulation which would be as fair to all concerned as are prices determined by competition. Any other alternative can only result in chaos."

Neale to Head Lane-Wells

LOS ANGELES.—John J. Neale has been elected president of Lane-Wells Co. He succeeds Rodney S. Durkee, who moved up to chairman of the board. Walter T. Wells was named founder-chairman.

Neale, assistant to the president for the past year, also was named a director. The company increased its board to 11 members, and Neale's election leaves one vacancy to be filled.

J. J. NEALE

R. S. DURKEE

Neale joined the company as a loader in Houston in 1936, moving up to subdistrict superintendent, division sales engineer, district superintendent, Gulf Coast division sales manager, and Gulf Coast division manager.

Durkee joined the company in 1938 as executive vice president after nearly 23 years with major oil companies. He became president in 1939.

Wells, a co-founder of the company in 1932, served as president until 1939 and chairman since that time.

T.G.T. Absorbs Subsidiary

HOUSTON.—Tennessee Gas Transmission Co. has absorbed the properties of its former wholly owned subsidiary, Northeastern Gas Transmission Co. and is now operating them as part of its system.

Northeastern's holdings included lines in Massachusetts, Connecticut, New Hampshire, and Rhode Island.

Strike Threat Hinted

O.W.I.U. president intimates he's in favor of dropping no-strike policy in approaching contract negotiations

KANSAS CITY.—President O. A. Knight of the Oil Workers International Union soon may start waving a strike club over the head of the oil industry.

Apparently convinced that the union's "unloaded gun policy" will fail to get the desired 5 per cent wage increase, Knight has intimated he's about ready to go back to his old weapon.

His carefully worded threat came just before last week's meeting here of the National Coalition of Oil Unions, which is intent on coordinating its efforts for wage increases.

Almost simultaneously with the wage discussions, O.W.I.U. reopened its drive to bring independent oil-workers unions into the proposed Oil and Chemical Workers International Union. The temporary ratifying committee which is spearheading the merger movement was summoned here at week's end to map future strategy.

Hopes of forming a super union representing workers in petroleum and allied industries were a little brighter among C.I.O. officials following the recent decision of United Gas, Coke and Chemical Workers to join forces with O.W.I.U. *(The Oil and Gas Journal, September 20, page 137).*

However, it was considered a distinct possibility that amalgamation of these two C.I.O. groups would hurt efforts to bring small independent unions into the fold. Some of the independents are belligerently opposed to the C.I.O. and fear its domination.

Negotiations fail . . . While concentrating on efforts to increase its numerical strength, O.W.I.U. has failed so far in obtaining a 5 per cent wage increase "or its equivalent" which the union's policy committee set as a goal last June.

Most glaring evidence of failure is the breakdown in negotiations with Sinclair Oil Corp., the only company with which O.W.I.U. deals on a national basis. Negotiations on the union's plan for greater fringe benefits became deadlocked August 25. The union later proposed a 5 per cent wage increase (11½ cents per hour) and the company balked. Talks were terminated by the union pending further action on the policy level.

Recent contract negotiations with other companies generally have followed a similar pattern.

Knight threat . . . Probably nobody is more aware of the O.W.I.U.'s failure to get its proposed wage increase than is Knight. He indicates he's about in the mood to junk the O.W.I.U. policy committee's decision "to 'unload the gun' and enter negotiations with an advance commitment not to strike for this increase."

"We are becoming more and more convinced that reasonable, logical discussion of the facts will not convince management of the justification of wage increases," said Knight.

"We had our doubts, when this program was adopted last June, as to whether or not it would work . . . ."

Knight said the union's "peaceful approach" has been countered "with an unprecedented number of demands on the management side."

Knight pointed out that negotiations will continue under the no-strike pledge until strategy is changed either by the policy committee or by vote of the union at its international convention.

The union will hold its next regular convention in Cleveland November 15. It is scheduled to vote on the merger with the Gas Coke and Chemical Workers at that time, and Knight says he anticipates it will review the no-strike policy.

Jersey Wants More Humble

NEW YORK.—Standard Oil Co. (N.J). plans to make an offer to increase its ownership of Humble Oil & Refining Co. from approximately 72 per cent to 80 per cent so that the tax returns of the two companies can be consolidated.

The recent tax law passed by Congress set 80 per cent as the minimum ownership of stock to permit income tax consolidation. Before the new law passed, 95 per cent ownership was required.

Jersey Standard is considering exchanging its shares for those of Humble at the rate of nine Standard for ten Humble. The announcement that Jersey desired to increase its holdings in Humble made the Texas company one of the most active on the American Stock Exchange. Humble's stock rose 6 points from 78½ to 84½ while on the New York Stock Exchange, Jersey gained from 99¼ to 100.

Standard owns 26,023,384 shares of Humble stock.

Atomic Energy: Oil Competitor?

NEW ORLEANS.—What does atomic-energy development mean to the oil industry?

Two experts, addressing different oil associations here, agreed that atomic reactors will carry the big burden of future energy requirements and will be major competitors of oil and gas.

They disagreed on when this will happen.

F. K. McCune, of General Electric Co., told the Independent Natural Gas Association of America economical electric power from atomic-generating plants will be available perhaps within 5 years, and certainly within 10.

Edwin A. Wiggin, of Atomic Industrial Forum, Inc., told the Louisiana-Arkansas Division of the Mid-Continent Oil and Gas Association, atomic power probably will not be competitive within 10 years, and perhaps not for 15.

They did agree, however, that:

. . . **Atomic fission** is definitely a practical source of energy which will supply much of the fuel demand of the future.

. . . **Commercial development** will be speeded up by passage of the Atomic Energy Act, which encourages private enterprise to develop industrial applications.

. . . **Future energy demand** will be so great that oil, gas, and coal could not possibly fill the needs. Development of atomic energy for this purpose is essential.

. . . **Major technical problems** exist, but the nation-wide atomic staff of 142,000 — which will increase — will solve them.

. . . **Until atomic energy** moves into the power field, oil and gas will be required in constantly increasing amounts.

McCune at the I.N.G.A.A. . . .

"In May of this year, I predicted that possibly 5 years, and certainly 10, would find us generating economical electric power from atomic energy in such single purpose plants. Two types of reactors were outlined, either of which is competitive with fuel at 35 cents per million B.t.u. (Editor's note: Equivalent to natural gas at 35 cents per M.c.f. or residual fuel oil at $2.10 a barrel) . . . All our study since that time simply reinforces this opinion. . ."

"I believe that the first economic full-scale commercial atomic power plant will be a dual market plant—designed both to produce weapons material and heat for conversion to electricity. These may be started, I believe, as soon as the legal and procedural road blocks are out of the way. . ."

"Fuel costs in a practical reactor can be nearly zero. I believe that in the 5 to 10-year period I mentioned they are likely to be competitive with chemical fuel at 12 cents per million B.t.u. The over-all cost which must be assessed to the fuel will be higher, however, due to increased capital investment and operating cost. These additional costs leave the situation competitive with a conventional station using 35 cents per million B.t.u. fuel. This is without considering or placing any value on the byproducts of radiation. . ."

"In the not too distant future, although possibly 20 years or more away, I believe that we will see gas, oil, and coal start to assume what I think will be their ultimate role: the raw materials of a greatly expanded chemical industry. Meanwhile, we will continue to use our chemical fuels in ever-increasing quantities. . ."

"In the field of transportation, the start of an atomic navy has been made. I am practically certain that atomic powered military aircraft can be produced and will have capabilities well worth their cost. Frankly, however, I see few other transportation possibilities—except for, of course, atomic-electric applications. . ."

"In the field of heating, there may be some specialized processes where atomic energy can be used directly. I think it more likely, however, that electricity will in the end take over the main heating load. . ."

Wiggin Before an Oil Group . . .

"How does the development of reactor power affect the oil and gas industries? I think the answer here is that, at least as far as electrical power generation is concerned, it will have no immediate effect, say for the next 10-15 years. After that it may have some effect on the cost of oil and gas and AEC believes that the effect will be greater on oil and gas than on coal. The reason for the expected small effect is the expected increased consumption of electrical power. . ."

"I would not guess that many of us will live to see many atomic powered automobiles. . ."

"Regardless of the effect of atomic power on the oil and gas industries, I think that atomic by-products have already had an effect and will have more in the future. . ."

"The principal problems today are not concerned with whether atomic energy can be used to produce electric power or even with how this can be done, but with how it can be done economically. . ."

"When we consider that the fission of 1 g. of uranium per day is approximately equivalent to 1 megawatt and that the energy potentially available in the world's recoverable reserves of uranium is estimated to be as high as 23 times the energy from the world reserves of fossil fuels, including petroleum, natural gas, and coal, it is redundant to point to this as industry's primary interest in nuclear reactors. However, reactors have other potential applications. For example, it has been suggested that reactor heat may prove useful for commercial heating or for certain industrial processes. . ."

"The time scale perhaps depends on the extent of future industrial participation as much as anything. . ."

"Of the more than 142,000 people working on the atomic energy program, more than 95 per cent work for industry and only indirectly for government. . ."

"On August 30 . . . President Eisenhower signed the Atomic Energy Act of 1954. The government monopoly is ended . . . Industry for the first time now has the legal right to exercise its own imagination and initiative in the atomic energy field—to spend its own money, to take its own risks, and to benefit from its own accomplishments. . ."

Continuing study urged for . . .

Finding Cost of Crude Oil

NEW ORLEANS.—The oil industry should set up a separate organization to make a continuous study of the cost of discovering and producing oil, James V. Brown, secretary of the National Petroleum Council told the annual meeting here of the Louisiana-Arkansas Division, Mid-Continent Oil and Gas Association.

Unless the cost of replacing underground reserves is known, Brown warned, the industry will not be able to defend its depletion allowance and its price and profits structure, and it may find itself selling its oil at far less than its replacement cost.

The oil industry will have to be more prosperous in the coming years than it has been in the past if it is to meet the expected increase in demand and will have to find 150 billion barrels of oil during the next 25 years as compared with the 85 billion barrels found during the past 100 years, he said.

Costs have soared . . . Available figures indicate that the average cost of finding new oil reserves in the last 2 years was from 7 to 11 times the cost in the 5 prewar years ending in 1941, Brown said, and this year the industry's overall expenditures for exploration and production are running somewhat in excess of 10 per cent over last year.

"Traditional accounting methods for computing depletion and depreciation on cost do not reflect currently higher replacement costs of acquiring and equipping oil properties," Brown said.

Information of what it really costs to find and produce oil is needed now to defend the industry against public attacks and may be needed soon to determine prices if the Federal Power Commission exercises full jurisdiction over gas production, Brown said.

"Misleading statements are continually appearing in the press and are heard over the radio and television. Our legislators are being confused about oil-industry profits and about certain factors of cost which are proper deductions in arriving at taxable income from the production of oil and gas."

Case on depletion . . . For example, he said, it is commonly believed that the depletion allowance of 27½ per cent is excessive, but actually the statutory limitation that depletion may not exceed 50 per cent of net income operates to keep the depletion deduction to about 15 per cent of gross income for the industry as a whole.

Government figures show, he added, that the over-all rate of cost depletion for the industry is substantially in excess of this 15 per cent average and quite likely is even higher than the maximum allowance of 27½ per cent of gross income.

Illinois Play Picks Up

DECATUR, Ill. — A five-pool development play is picking up speed in this area of Illinois.

The trend follows an east-northeast path from Edinburg pool in 14n-3w, Christian County, to Oakley pool in 16n-3e, Macon County. It includes Mt. Auburn, Blackland, and Decatur pools. Mt. Auburn has 40 producing wells. Blackland 10, Decatur 3, Oakley 4, and Edinburg 4.

Keystone Oil Co. 1 Driskell "B" in 17-14n-3w, Edinburg pool, seems to be the best well in the development area. It flowed 720 bbl. of oil per day natural from porous Silurian lime at a shallow 1,686-93 ft.

Four companies have considerable acreage in the area. Sun Oil Co. has about 45,000 acres, Carter Oil Co. 30,000 acres, M. H. Richardson 20,000 acres, and Phillips Petroleum Co. 10,000 acres.

Sohio Work to Start Soon

LIMA, Ohio. — Standard Oil Co. (Ohio) will start construction by November 1 on a 300-ton per day anhydrous ammonia plant at its refinery here.

The plant, Sohio's first petrochemical venture, will be fed in part by by-product hydrogen from a 12,000-bbl. Platformer scheduled for completion soon. The remainder of the feed stock will be natural gas.

M. W. Kellogg Co. will build the ammonia plant, the nitric acid plant, and the solution plant. Arthur G. McKee & Co., Cleveland, will build the urea plant.

Of the plant's daily output, 200 tons will be processed into 125 tons of urea, 60 tons of nitric acid, and 200 tons of nitrogen solution.

Industry Briefs

BUTLER, Pa.—Dr. K. L. Fetters, assistant to the vice president in charge of operations, Youngstown Sheet & Tube Co., will be principal speaker at the fall meeting of the Middle District Producers Association here September 27. His topic will be "Fibercast Tubing and Line Pipe."

AUSTIN.—Texas Atty. Gen. John Ben Shepperd has ruled that natural-gas producers may sell gas as fuel for irrigation pumps in Texas without being subjected to regulation as a gas utility. The ruling exempts producers from payment of state gross-receipts taxes on such sales.

HOUSTON. — American Republics Corp. has asked for bids on its planned cycling plant in South Hampton field in Hardin County, Texas. The plant is designed to handle 20,000,000 cu. ft. of natural gas daily.

DALLAS.—The American Association of Oilwell Drilling Contractors has released a new safety film entitled "Rig Housekeeping" for distribution through the organization's safety committee. The 16-mm. color film runs 10 minutes. It portrays the relationship between lack of rig housekeeping and of rig accidents. Copies may be purchased or rented by contacting the A.A.O.D.C., 321 Reserve Loan Life Bldg., 505 North Ervay Street, Dallas 1, Tex.

WASHINGTON.—Reuben Goldberg has resigned after 17 years as counsel for the Federal Power Commission on natural gas and electric matters. He will enter private law practice here. Goldberg tried some of the FPC's major gas-rate cases and argued the Government's case in important suits in appellate courts.

LOS ANGELES.—Fluor Corp., Ltd., has acquired 55 per cent interest in Singmaster & Breyer, Inc., New York chemical and metallurgical process engineering firm. The remainder of the stock was retained by partners in the New York firm.

GREAT BEND, Kans.—Sinclair Pipe Line Co. has moved its district offices here from Independence, Kans., company headquarters. G. M. Johnson, vice president in charge of crude lines, explained the new location will be more centrally located for operation of crude lines from new fields in central and western Kansas.

New "Era" in Lubes?

Industry opinions differ on whether or not values of new multiviscosity lubricating oils outweigh their drawbacks

George H. Weber

ATLANTIC CITY.—Do the new multiviscosity oils really usher in a "new era" in automotive lubrication? Opinions within the industry seem to differ.

The difference involves evaluation of the benefits and drawbacks of the new volatile distillate-type oils. Some companies' research results have sold them completely on the new multivis lubes. Others are taking a more cautious attitude.

The latest symposium on the subject reflected both schools of thought at the annual meeting of the National Petroleum Association here.

In the first of four papers, R. K. Williams of General Motors Corp. pointed to some advantages and some disadvantages of the new oils. GM's tests verified others in finding that all-distillate blends with viscosity-improvers definitely contributed to cleaner engines. This lower engine deposition resulted in octane requirement increases of three less numbers.

Results mixed . . . This benefit, coupled with others, showed a fuel economy at 30 m.p.h. constant speed to be slightly better. In comparative tests under normal suburban highway driving conditions, they found no advantage in favor of the new oils, Williams said.

This slight increase in mileage ranging —6 per cent down to 2 per cent—is going to make it difficult for the average motorist to note any economy in the new high VI oils, Williams declared.

The author warned with oils containing VI improvers, the viscosity as measured in the laboratory does not correspond to viscosity under engine conditions. Some oils must compromise engine wear characteristics to other qualities, Williams said. This still raises a question as to how well the new type oils lubricate engines under severe engine conditions, and what is the minimum viscosity of the base oil which can be used with VI improver to maintain satisfactory lubrication.

General Motors tests of the new oils' performance in lubricating valve lifters showed mixed results. Wear was higher in some tests, low in others. Intake valve deposits with the new lubes were generally greater in volume, softer and heavier. Whether this is due to the VI improver or the volatility of the base stocks has not yet been determined to researchers' satisfaction, Williams concluded.

They are good—but . . . Carl W. Georgi of Quaker State Oil Refining Corp. said the new type oils can be good, but not so good that a "new era" in engine lubrication has been introduced. From company evaluations under road conditions, Quaker State verified a saving of 3 to 5 numbers in ORI (octane requirement increase).

This can be important to the driver whose car has a top octane requirement and whose driving is the critical stop-and-go type. In engines of more modest octane requirement or in engines used frequently in heavier or cross-country driving, the new oils do not seem to show any outstanding benefits, Georgi declared.

Bright stock in the basic oil blend showed definite benefits in reducing valve lifter wear, according to Quaker State tests. Tests using SAE 20 base oil containing bright stock showed 3 lifters pitted out of 16, whereas an SAE 10W-30 base oil showed 14 lifters out of 16 to be pitted. The trouble was eliminated in the first oil by addition of 1 per cent of an antiwear additive. The newer type oil required twice as much of the additive to eliminate the wear.

Georgi concluded day to day changes in atmospheric temperatures and varied uses of a car cause great differences in mileage. He doubts that the motoring public can detect significant benefits from the multiviscosity volatile type oils.

L. Raymond and J. F. Socolofsky of Socony-Vacuum Oil Co. outlined the formulation and testing of a new oil containing a blend of selected distillates with VI improvers and a new detergent inhibitor combination.

The new oil, the authors said, gave a much lower preignition requirement in one engine tested, a great reduction of preignition in another, and complete elimination of wild ping in a third. Road tests also showed a reduction of three numbers in the ORI when the new multivis oil was substituted for conventional SAE 20W oils.

Octane significance . . . This reduction in engine requirements was given considerable long range significance by the authors. It means a corresponding reduction in the ultimate level of fuel quality representing substantial savings in refinery investments, they said.

Further, the 3 octane numbers contributed by the new oil would permit automotive industry to step up plans for raising compression ratios by about 4 years. Estimating that it would take about that time for the industry to add 3 octane numbers to the national gasoline pool, they believe sufficient acceptance of the new type oils will let engine designers consider 1955 compression ratios which otherwise would

Airline Pact Signed

The largest gasoline contract ever made by United Air Lines was completed recently with Standard Oil Co. of California. The $50 million agreement covers United's petroleum purchases in the western section of the line for the next 4 years. It represents about 45 per cent of the airline's total expenditures for petroleum products. Signing the contract are Curtis Barkes (left), United vice president, and Richard F. Bradley, aviation manager for Standard.

not be scheduled before the year 1958.

Some new information was added to previous reports on investigations of Kendall Refining Co. R. L. Overcash, W. Hart and D. J. McClure brought up to date their findings on the effect of new multivis oils on combustion chamber deposits, oil consumption and viscosity change. In road tests, a 10W-30 oil showed an ORI averaging 6 numbers less than a conventional SAE 20 oil. During the same tests, they reported that equilibrium octane levels of the various cars using the new type oils, ranged from 2.5 to 10.0 numbers lower, with an average of 5.5. Suppression of knocking surface ignition (preignition) as they evaluated it, amounted to an average advantage of 8.5 octane numbers when using the multivis oil.

By engine laboratory comparison with an SAE 20 oil, the new 10W-30 oil was consumed at a high relative rate under normally low oil consumption conditions. The reverse was true under normally high consumption conditions. Further tests in vehicles on the road showed that this also happens in actual service with both trucks and passenger cars. Extensive tests also showed that the new multivis lubes maintained viscosity and high viscosity index for normal periods of use.

Electronics In Refining

Fully automatic controls get better control, require less start-up time, U.O.P. engineer tells Instrument Congress

G. L. Farrar

PHILADELPHIA. — Better control and reduced starting time are possible in refining units if they are completely equipped with automatic electronic controls.

D. M. Boyd, chief instrument engineer for Universal Oil Products Co., outlined the advances made in processing controls at a meeting here of the International Instrument Congress. Boyd cited results obtained with a U.O.P. Platformer recently completed for Rock Island Refining Co. at Indianapolis.

Boyd said time required for start-up operations was greatly reduced due to the fast responses and excellent control characteristics of the fully-automatic instruments. Within a few minutes, all process variables were maintained at desired controlled values, he said. The unit was lined out at on-stream conditions within 3 or 4 hours.

Faster response in the temperature control systems was the principal reason for the big reduction in start up when compared with the time normally consumed with conventional pneumatic instruments.

Experimental work . . . Before specifying electronic instruments for the Rock Island installation, frequency-response tests showed electronic controllers provide faster responses—thus faster control—than do conventional pneumatic controllers in normal installations. However, Boyd said if the pneumatic controller is mounted directly on the control valve, response may be faster with pneumatic controls.

Tests made by U.O.P. instrumentation personnel show the major advantages of electronic controllers are:

. . . Increased reliability in cold climates. The small orifices in pneumatic controllers are easily plugged by freezing moisture.

. . . Elimination of tubing racks. The major cost in installing pneumatic instruments is building tubing racks. Regular pipe racks are used for electrical leads to electronic instruments.

. . . Increased control flexibility. Actions of several electronic controllers are easily interrelated using electric signals.

. . . Better control. This is due mainly to reduction in controller dead band and consequent reduction in time required to detect the level of the measured variable.

. . . Less noise. Servomechanism techniques may be used in electronic controllers to filter out noise.

New valve system . . . Boyd said the present electronic instruments still require air to move control valves. Valve response is thus slower than is desired. In addition, air diaphragm motors are unstable under severe valve unbalance which often exists, especially in high pressure systems. It also is difficult to position the valve at the desired point on failure of the air system.

A practical solution to these problems, Boyd said, is the use of a hydraulic valve positioned by a small electric motor. The output of the controller would be used to operate the pilot valve in the hydraulic line.

WEST COAST

Test Being Completed

LOS ANGELES.—Monterey Oil Co. is completing the first exploratory test drilled from its $1,000,000 earth-filled island built 1½ miles offshore from Seal Beach.

The no-dope test, Monterey-Texas 3 State, was drilled to 10,162 ft. It later was plugged back and 7-in. casing was set at 5,906 ft.

Monterey did not reveal whether Terminal and other deeper pays encountered in the Wilmington field 4½ miles northwest were found to be productive or whether the shallower Ranger zone was found. The operation is being carried out jointly with The Texas Co., which holds a 50 per cent interest in the 1,200-acre state-granted lease.

Offshore Lease Awarded

LOS ANGELES.—By a 5 to 2 vote, the Santa Monica city council has awarded General Petroleum Corp. a 10-year lease on city-owned offshore tracts.

Before the award becomes effective, however, Santa Monica voters must abolish laws which prohibit drilling within city limits. The balloting is scheduled for November 2.

General Petroleum's bid, the highest of five submitted, offered a 35 per cent royalty and a cash bonus of $500,000 if the drilling ban is lifted. Other bids were submitted by Standard Oil Co. of California, Richfield Oil Corp., and Union Oil Co. submitted a joint offer for itself, Shell Oil Co., Continental Oil Co. and Superior Oil Co.

Line May Replace Tankers

LOS ANGELES.—Union Oil Co. is expected to announce shortly letting of contract for a 65-mile, 12-in. crude line from near Ventura, Calif., to its 125,000-bbl. refinery here.

The carrier would eliminate the tanker haul which the company has been using 3 years, since completion of a submarine loading line on the coast south of Ventura.

Union's crude production in the Santa Paula region near Ventura has grown from 500 bbl. daily in 1946 to about 15,000 bbl. daily now. Facilities for transporting the crude to the coast were rebuilt in 1951. An early-day system had been salvaged because of declining production.

Tidelands Clash Near

Stakes are high in little civil war over offshore area offered for leasing by Louisiana and federal Government

BATON ROUGE.—Louisiana and the federal Government will clash October 13 on the sale of oil, gas, and sulfur leases on the Continental Shelf.

The clash will come over disputed ownership of tidelands lying between the 3-mile line recognized by the federal Government and the new state "boundary" set this year by the Louisiana Legislature. The latter line ranges approximately 35 miles offshore in some places.

About 90 of the nearly 200 tidelands tracts which the federal Government is offering for lease October 13 lie within this disputed area. The Louisiana Mineral Board plans to offer the disputed tracts at a state-sponsored lease sale the same date.

Delay development? . . . Some observers fear the controversy might delay additional drilling in the disputed area for months, or even years. But Gov. Robert Kennon of Louisiana has a more optimistic outlook. He believes the state and national governments can iron out their differences so oil and gas exploration can continue while the courts decide who owns what.

The governor intimated he doubts validity of Louisiana's claim. He indicated he felt the state could legally claim tidelands only as far as 3 leagues (about 10½ miles) from the state's "actual shore line—where land meets water."

Max Gianelloni, assistant administrator of the Louisiana Mineral Board, said sealed bids for leases on disputed tracts will be opened "precisely at the same hour and on the same day" that the Government's Bureau of Land Management plans to open bids in Washington.

The Louisiana lease, he said, will be carried out "pursuant to Act 33 of the 1954 Louisiana Legislature." This is the act by which the Pelican State lawmakers set Louisiana's controversial "boundary" *(The Oil and Gas Journal, August 2, page 54)*.

The state's Mineral Board has warned operators that any leases they might obtain in the federal sale will be contested in court.

Protest filed . . . Gianelloni said the board has protested the Government's plans to lease any submerged land claimed by the state and has called on the Bureau of Land Management to withdraw its request for bids on the 90 tracts within the boundary as defined in Act 33.

The federal agency declined to cancel the sale but admitted the courts might have to decide who has final jurisdiction over the area in question.

Stakes high . . . Royalties at stake might amount to millions of dollars. So far, wells in the tidelands off Louisiana have proved much more prolific than those off the coast of Texas.

Hundreds of thousands of barrels of oil already have been produced off Louisiana's coast within the 3-mile limit, but geologists say the area beyond that limit appears to have an even greater potential.

Interior Department officials indicate they expect a minimum return of $50,000,000 from the October 13 sale. On the block are oil and gas leases on approximately 748,000 acres and sulfur leases on more than 500,000 acres.

Meanwhile, the Government announced it will open bids in Washington November 9 for oil and gas leases on 111,789 acres of lands off the coast of Texas. Texas claims its tidelands out to the 3-league limit, and the Government has honored its claim under the Submerged Lands Act.

Shell Has Gulf Discovery

NEW ORLEANS.—Shell Oil Co. has discovered another Gulf of Mexico oil field off the southeast tip of Plaquemines Parish.

The discovery well, on State Lease 1012 in Block 28, South Pass, is rated good for 215 bbl. daily of 31.9°-gravity oil, flowing through 9/64-in. choke with gas-oil ratio of 570:1 under pressure of 1,300 psi.

Production is from a casing-perforated interval at 7,364-72 ft. in Miocene sand. Hole had been drilled to 8,876 ft.

The location is more than 1½ miles southeast of South Pass Block 24 field discovered by Shell in 1950, and one of the most extensively developed and prolific fields in the gulf. The new well is in open water 5 miles from the nearest land of any description.

Unitization Asked

Plans for East Long Mott field outlined by Quintana

AUSTIN.—Quintana Petroleum Corp. last week asked the Texas Railroad Commission to approve a unitized water-flood program which would recover an estimated 2,570,000 bbl. of additional oil from the Frio formation of East Long Mott field, Calhoun County on the Gulf Coast.

Testimony at the hearing disclosed the reservoir is 80 to 90 per cent depleted under primary means of production. The field was discovered early in 1948.

The field includes 1,000 productive acres and has 32 wells producing from the Frio, encountered at an average depth of minus 7,200 ft. J. J. Crowder, Quintana engineer, said salt water would be injected through input wells around the perimeter of the field through an open-type system.

Field data . . . The field had produced almost 2,200,000 bbl. of 42°-gravity crude at the first of the year. Reservoir drive has been solution gas principally, with some help from expansion of small gas cap.

The accumulation of oil and gas in the field, Crowder said, occurs in closures against dual faulting. Five fault segments have proved productive.

Pollution Control Planned

HOUSTON. — Consolidated Chemical Industries, Inc., will construct two sulfuric-acid regeneration units at its plant near here to reduce air pollution in the Houston Ship Channel area. They are expected to be in service sometime next year.

Cost of the units will be about $9,000,000. They will process spent sulfuric acid piped in from other plants which have been burning it.

Offshore Line Contracted

HOUSTON.—Standard Oil Co. of Texas has awarded Brown & Root, Inc., a contract to lay a 1½-mile underwater pipeline in the tidelands.

The $150,000 line will run from Kleberg County to an offshore platform where Stanotex recently completed the first commercial oil discovery on the Texas tidelands.

The discovery flowed 348 bbl. of oil daily into a barge on test.

Texas Allowable Cut

Railroad Commission slashes figure after September hike; October output figured on 15 days, set at 2,788,141 bbl.

AUSTIN.—The allowable increase Texas producers received for September was short-lived. The Railroad Commission ordered a production cutback for October.

The October allowable was set at 2,788,141 bbl. daily, a drop of 49,629 bbl. daily below the September figure. The boost in September broke a trend during the year to cut the Texas allowable.

The cut was achieved by leaving the number of permissible producing days for the 31-day month of October at 15, both statewide and for East Texas field.

For the second straight month, the commission was faced with either increasing or lowering the allowable due to the change from a 31-day month to a 30-day month and back again. Almost unanimous industry approval for a decrease at the most recent hearing made the commission's decision much easier than in August when purchasers were fairly evenly split. Only one purchaser, Sun Oil Co., held out for 16 days. Two other majors, Humble Oil & Refining Co. and Magnolia Petroleum Co., reduced their initial nominations for 16 days to 15 at the hearing.

The hearing developed evidence of a continued troubled market situation in the state. A few cases where producers are unable to market their crude are still cropping up.

A representative of Sutton Drilling Co. testified that its 380 bbl. daily of allowable production in Palmer, Acleto Creek, and Scottie fields of Wilson County is without an outlet. The crude, he said, had been taken under a temporary spot arrangement by Toronto Pipeline Co. Toronto has informed Sutton that it can no longer take this crude, he said.

On the other side of the fence, it appeared probable that most allowable crude in the Red Fish Bay-Mustang Island-Fulton Beach area on the Gulf Coast would be taken by purchasers during October. Buyers for crude in this area have been scarce for the past 2 months.

OCTOBER PRODUCTION ALLOWABLE

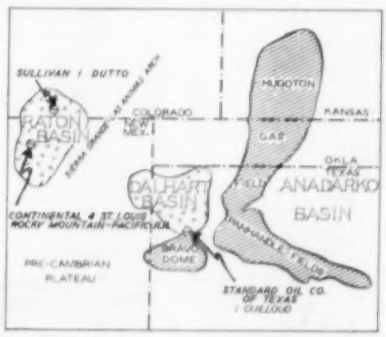
District—	October	Change from Sept. 4
1—Southwest	51,372	+78
2—Gulf Coast	130,537	−3,844
3—Gulf Coast	432,327	−6,873
4—Southwest	240,053	−345
5—East Central	45,371	−1,007
6—Outside E. Texas	111,617	−2,620
6—East Texas field	205,876	−5,860
7-B—West Central	159,401	−2,573
7-C—West Central	191,513	−4,496
8—West Texas	866,544	−18,920
9—North Texas	238,134	−2,827
10—Panhandle	115,396	−378
Total	2,788,141	−49,629

Dry Basins Promising

Tests in Dalhart and Raton basins indicate discoveries

DALHART, Tex.—Two dry basins, the Dalhart and Raton, show promise of becoming producers.

The Dalhart of the Texas Panhandle has its first oil well 12 miles southwest of Hartley. A pump is being installed on Standard Oil Co. of Texas 1 Ernest Guilloud, Sr., after the operator swabbed 125.8 bbl. of oil and 40 bbl. of water plus 23 bbl. of mud in 33 hours and 30 minutes. Production is from perforations at 6,174-86 ft. in the Pennsylvanian granite wash. An earlier test swabbed 8 bbl. of oil and some water from 6,164-74 ft. after acidization and fracture treatment.



The important prospect is on the northeastern flank of the Bravo dome, one of the prominent geologic features of the Panhandle area, on the southeastern rim of the small basin. The indicated strike is about 22 miles northwest of nearest production, two-well Channing-Pennsylvanian field.

Raton basin . . . Across the Sierra Grande arch, which separates the two basins, Continental Oil Co. 4 St. Louis, Rocky Mountain & Pacific Railroad Co. cored a 50-ft. Dakota (Cretaceous) sand section with porosity and oil staining to give promise to the dry Raton basin.

The wildcat, in Colfax County, New Mexico, is one of a series being drilled by Continental Oil Co. in this area of the state. The firm holds 500,000 acres of leases in New Mexico's portion of the two-state basin. The 65 by 160-mile basin covers an area of about 10,000 square mi. in Colorado and New Mexico. The basin has had little previous drilling.

Just 3 weeks ago Bruce Sullivan Drilling Co. 1 Dutto, 10 miles east of Trinidad, Colorado, tested some oil shows in the Pennsylvanian-Madero sand. This wildcat is having fish trouble at present. *(See Oil and Gas Journal, September 6, page 157.)*

Panhandle Still Hot

Exploration adds county, Permian gas production

AMARILLO.—The Texas Panhandle continues to be the hottest exploratory area in the Mid-Continent with the opening of new Permian gas production and the addition of a new producing county.

Hutchinson County . . . The north-central part of this county has an indicated Permian gas discovery at Phillips Petroleum Co. 1 Ivy "A," 10 miles south of Hansford.

The wildcat, in Section 48, Block 5-T, T&NO Survey, topped the Permian brown dolomite at 3,148 ft. A test was run in the white dolomite at 3,462-83 ft. Gas surfaced in 3 minutes and stabilized at 3,205 M.c.f. per day after 40 minutes. Another white dolomite test at 3,486-94 ft. surfaced gas in 5 minutes at 1,081 M.c.f. per day. The operator is running a third test at 3,494-3,505 ft.

The Permian gas shows at the 1 Ivy "A" are of considerable interest because the only previous Permian production in the Panhandle is in huge Panhandle-Hugoton field and at Quinduno in Roberts County. This prospective hit is more than 20 miles north and 15 miles east of Panhandle field gas and oil production. It is over 35 miles northwest of Quinduno field. Nearest production is 1 mile southeast at two-well North Hutchinson field, a Morrow and Douglas sand (Pennsyl-

vanian) producer. New Gruver-Pennsylvanian field is 13 miles north in the central part of Hansford County.

Dallam County . . . First production is now assured this northwestern Panhandle county.

Humble Oil & Refining Co. 1 D. D. Sheldon, 3 miles southwest of Kerrick in Section 16, Block 50, H&TC Survey, in the extreme northeast corner of the county, is flowing an estimated 2,000 M.c.f. of gas per day from the Cisco-Pennsylvania. Strike is 7 miles west of new Stratford-Cisco field. This recently opened field has four gas wells.

SACROC Flood Begun

Unit's chief engineer discloses water being injected in three input wells; return to statewide allowable sought

SNYDER, Tex.—Water injection has started through three input wells in the huge SACROC Unit in Kelly-Snyder field in Scurry County.

This was disclosed by E. L. Anders, Jr., chief engineer of SACROC, at the recent Texas allowable hearing. He also revealed the water-injection system for the big unit has been completed.

Anders revealed the information while urging that the field be returned to statewide producing-day status rather than operate under a special allowable. Kelly-Snyder's allowable was cut by the Texas Railroad Commission to 15 days about a year ago until the pressure-maintenance project was placed in operation.

Anders told the commission that transfers of the allowables of 139 wells in the field have been effected. Water injection, he said, will begin in 50 additional input wells as soon as the commission approves the transfer of allowables of another 64 producers. Hearings on the latter transfers already have been completed, he said.

Anders said water will be injected at rates up to 200,000 bbl. daily when transfer applications now pending are approved. An ample supply of water is assured from Lake J. B. Thomas, he said.

Present output . . . Water now being injected through the three input wells is sufficient, Anders said, to offset reservoir voidage caused by production of 176,640 bbl. of oil monthly. Allowable transfers already approved have reduced voidage resulting from production of 239,000 bbl. of oil per month. Transfers pending will increase this figure to 257,770 bbl. of oil per month, he said.

The SACROC Unit takes in nearly 50,000 productive acres in Kelly-Snyder and is the world's biggest pressure-maintenance project—with the exception of East Texas field—from the standpoint of acreage and of additional oil estimated recoverable.

The big project calls for injecting water along the crest of the reservoir and gas at the northern end of the field.

Albuquerque Line Announced

ALBUQUERQUE.—Malco Pipeline Co., Inc., has been granted accelerated amortization of $1,173,100 for a 91-mile, 6-in. products line from Prewitt, N. M., to here.

The project will deliver products from Malco Refineries, Inc., 2,500-bbl. refinery at Prewitt. The total cost of the line will be $1,275,000. An additional $88,200 will be spent for storage.

The line is the second products carrier announced for the Albuquerque area within the past month. Standard Oil Co. of Texas previously had said that it would lay a 248-mile, 6-in. line from its El Paso refinery to Albuquerque *(The Oil and Gas Journal, September 6, page 65).*

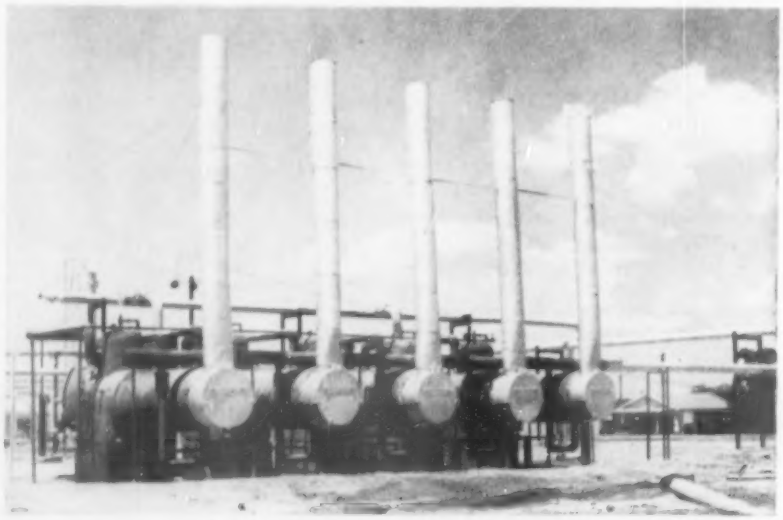
Navajo Refineries, a newly formed company, also has announced plans to construct a 10,000-bbl. refinery here *(The Oil and Gas Journal, September 13, page 91).*

Texas Eastern Line OK'd

SHREVEPORT. — Texas Eastern Transmission Corp. has received the green light from the Federal Power Commission to lay 58 miles of 16 and 20-in. pipeline from Joaquin to Longview, Tex.

The new line will permit the company to transfer gas originating at Provident City, Tex., to its 24-in. line at Longview. Presently, the company has no facilities south of Little Rock for transfer between these lines.

The line will be built in two sections. The first will be 26½ miles of 16-in. from Joaquin to Carthage field in Panola County, Texas, and the second section will be 31½ miles of 20-in. from Carthage field to Longview.



Ranger Plant Is Back in Style

RANGER, Tex.—Like fashions in women's skirts, styles in fuels sometimes fluctuate.

So it is at the oldest plant on Lone Star Gas Co.'s system—its Plant 108 in Ranger field, Eastland County.

This plant was built in 1921 by Chestnut & Smith Corp., together with 10 other plants in the Ranger area. Plant 108, the only one of the 11 now operating, was sold to Lone Star in 1931.

The old plant has had gas-fired oil preheaters from the start. Design of the plant was copied by Chestnut & Smith Corp. from that of several of its eastern Oklahoma plants where gas was scarce.

In the early years of its operation,

the plant was looked upon as old-fashioned by the industry which generally used steam. During the past 10 years, however, plant operators have fallen back on gas for fueling oil preheaters, since less is required to supply direct heat than to generate team.

The old plant still is handling about the same volume of gas it did 20 years ago. Production has decreased considerably in the Ranger area, but the drop has been made up with additional supplies routed through the plant from other sources. Top production of natural gasoline at the plant is about 60,000 gal. daily.

ROCKY MOUNTAIN

Pipeline Spurs Drilling

Plan for Pacific Northwest's gas line give a big push to exploratory activity in Wyoming, Utah, and Colorado

FARMINGTON, N. M.—The expected big wildcat push along the route of the proposed Pacific Northwest Pipeline has begun in earnest.

The proposed pipeline has accelerated exploratory activity along the southeastern leg of the proposed route from the Green River to the San Juan basin. Each week an impressive list of new drilling locations is announced for the rank areas of the Green River, Uinta, Piceance Creek, Paradox, and San Juan basins.

Several new discoveries have been reported along the pipeline's route in Wyoming, Colorado, and Utah. Development work in established gas-producing areas, particularly in the San Juan basin, has increased.

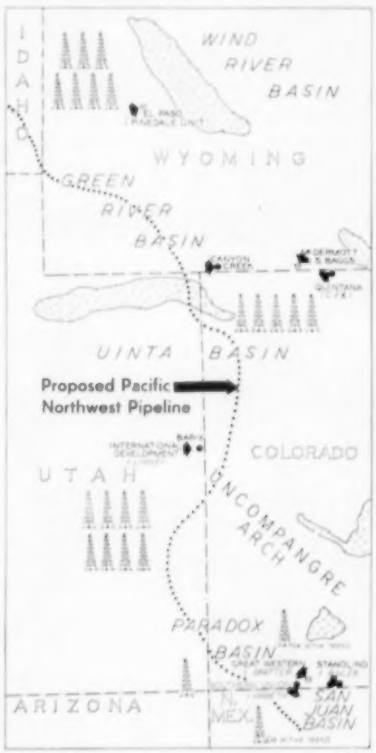
Wyoming . . . The most recent gas discovery in this state's pipeline area is Mountain Fuel Supply Co. 3 Canyon Creek Unit in Sweetwater County.

The Mesaverde strike flowed gas at the rate of about 10,000 M.c.f. per day. It is about 12 miles east of Stanolind Oil & Gas Co.'s oil and gas production at Middle Mountain. The current interest in Mesaverde possibilities in the Green River basin began at Middle Mountain in 1952.

Another new prospect for the area is J. Ray McDermott's recovery of gas at the estimated rate of 2,000-3,000 M.c.f. per day at 1 South Baggs-Government in Carbon County.

One of the most closely-watched wildcats in Wyoming's long oil history is El Paso Natural Gas Co. et al's Pinedale structure test which is going down to 15,000 ft. Pinedale is one of the state's largest structures. In the highly active Piney areas of Sublette County near the pipeline's route there are seven tests currently active.

All this Wyoming activity is in the Green River basin, the least-explored and most promising basin in the state.



It has been said the Green River has prospects of becoming a future San Juan basin.

Colorado . . . The northwestern Colorado portion of the Green River basin has five interesting tests under way. Another Mesaverde gas strike was added to the area's record at Quintana Production Co. 1 C. F. & I. Corp. in the Slater Dome area of Moffat County. It was finaled flowing 1,500 M.c.f. of gas per day.

In the Paradox basin and other areas of southwestern Colorado there are 16 active locations reported. Southern Union Gas Co. has a flow of 3,000 M.c.f. of gas per day on test of the 1 Virbeth Land Co. in La Plata County. Production is from the Pictured Cliffs sandstone, a big San Juan basin producer. The well is about 1½ miles southwest of South Red Mesa gas production. Southern Union has two other active tests in the immediate area.

Stanolind Oil & Gas Co. 1 Bixler Gas Unit in Archuleta County is shutin after recovering gas from the Pt. Lookout sand. The well flowed at the rate of 762 M.c.f. per day. This wildcat is southeast of Ignacio field and north of New Mexico San Juan basin production. It is part of the ever-growing campaign for development and wildcatting on the Colorado side of the basin.

Great Western Drilling Co. is still drilling after recovering gas on test of the Fruitland at 1 Spatter in La Plata County. The well tested zones from 2,150-2,223 ft. with recoveries ranging up to more than 500 M.c.f. per day. The relatively shallow depth and the fact that results are similar to tests in the New Mexico portion of the San Juan basin stimulated interest in the well. It is about 5 miles southwest of Ignacio field.

In western Colorado El Paso has completed 4 Twin Buttes in Garfield County for a flow of 8,100 M.c.f. of gas per day in the Morrison. The field was opened in 1951 and El Paso acquired its holdings in the area last year. Both Entrada and Morrison have been proved productive in the block.

Utah . . . There are eight active operations in Grand County alone in this recently-awakened exploratory area. The latest strike indicated for the pipeline's route is International Development & Drilling Co. 1 Lineey in the Bar-X Unit, Grand County. The wildcat got an estimated 5,000-7,000 M.c.f. of gas per day from the Entrada. Production in the general area has been established in the Entrada and Morrison. The Bar-X Unit sits on the Colorado-Utah state line.

Gas Plant Opening Near

DENVER.—A natural-gas compressor plant near Sterling, Colo., is scheduled to be completed by October 1.

The plant will have a daily capacity of compressing 4,500 M.c.f. of gas from field pressure of 5 psi. to 800 psi. It will serve Mount Hope and Walker fields.

The plant is jointly owned by Paul F. Barnhart, J. Ray McDermott & Co., Inc., The Texas Co., Kansas-Nebraska Natural Gas Co., Inc., Bay Petroleum Corp., and Shell Oil Co. Blaw-Knox Co. was contractor.

CANADA

Gas Pact Signed

Trans-Canada spur will supply Northern Natural

CALGARY. — Trans-Canada Pipe Lines, Ltd., has signed a 25-year contract to sell natural gas to Northern Natural Gas Co. of Omaha.

To supply gas to Northern, Trans-Canada will build a 24-in. spur from its planned main line at Winnipeg south to Emerson on the Manitoba-Minnesota border. Northern will build a line north from its Minneapolis terminal to Emerson.

The contract is contingent on receiving the permission of both the United States and Canadian governments and upon acquiring adequate financing. However, the presidents of both firms predicted the contract would go through on schedule.

Northern is scheduled to start taking gas on October 27, 1955, at the rate of 100 million cubic feet per day. An additional 50 million cubic feet would be added on October 27, 1956, with increases of 50 million cubic feet scheduled for each of the following 3 years.

Northern Natural would use most of this gas in a pipeline which it proposes to build from Tioga to Fargo, N. D. *(The Oil and Gas Journal, August 2, page 63).*

Lake Bottom Survey Begun

SARNIA.—Pan Western Oil, Ltd., Calgary, is conducting a geophysical survey in a portion of Lake St. Clair as the first section of a two-part program that eventually will cover 130,000 acres in Lake St. Clair and Lake Huron.

Radar Exploration Co. is expected to take about a year to complete the St. Clair survey, then will move north of here, to the mouth of the St. Clair River to begin surveying a portion of Huron. The Lake Huron survey will start at the mouth of the river and extend northeast about 20 miles.

Well Tests Light Oil

REGINA.—Canadian Gulf Oil Co. and Canadian Devonian Petroleums, Ltd., have a new light-oil producer in the Mission Canyon in Frobisher field, southeastern Saskatchewan.

The 3 Collopy tested 40.4°-gravity crude at a rate of 36 bbl. an hour or 864 bbl. a day on a drill-stem test conducted in a 13-ft. interval. The well is believed capable of initial production of between 700 and 800 bbl. daily.

The test in the Collopy well was conducted in 4,651-61 ft. (kelly bushing, 1,940 ft.) Pipe recovery was 300 ft. of clean oil. The crude contained 2/10 of 1 per cent basic sediment and no water.

The well is the fifth in Frobisher field capable of Mississippian production.

The Collopy well is in LSD 3, 2-4-4w2, ¼ mile north of the Moffat dual producer and ¾-mile northeast of the Canadian Gulf-Canadian Devonian 9 Quinn discovery well.

Alberta Drilling Planned

CALGARY, Alta.—Canadian Gulf Oil Co. and Triad Oil Co., Ltd., plan to start drilling in 1955 on a big western Alberta block recently acquired in a farmout from Royalite Oil Co., Ltd., and Sun Oil Co.

The farmout covers 1,362,359 acres of reservation lands and 963 acres of freehold leases, the major portion of which is in the area between the Clearwater and Athabasca rivers. One reservation lies approximately midway between Pincher Creek and Turner Valley fields.

Under terms of the farmout, Gulf and Triad will conduct a long-range exploratory program, acquiring a 50 per cent working interest in the acreage.

Canadian Field Expanded

EDMONTON. — Nuco Petroleums, Ltd., operator for a group of independent oil companies, is nearing completion of a 20-well drilling program in the Dulwich section of the Lloydminster Sparky sand heavy-gravity oil field near the Alberta-Saskatchewan border.

To date, the company has completed 15 producing wells in its current program and all are reported capable of producing the daily allowable of 34 bbl.

MID-CONTINENT

Kansas Pool Prolific

KINGMAN, Kans.—New Willowdale pool on the northeast edge of Willowdale, 10 miles southwest of here, is having the best success of any new producing area in the state.

The latest extension well to the prolific field is Aurora Gasoline Co. 2 Mueller, SW NE NW 14-29s-9w. The well, operated by Aurora and Joe Aylward, is credited with an hourly flow of 125 bbl. of oil naturally from the Viola lime topped at 4,471 ft.

The fast-growing field was opened in June by Aurora 1 Amsden, SW SW SW 11-29s-9w. Pump potential was 265 bbl. of oil per day. In 3 months several wells with maximum production have been added. No dry holes have marred the field's record. Nearest production is Pat Creek pool, 5 miles northwest.

Daily allowable for the new successful well, the 2 Mueller, is 25 bbl. This can be obtained by a quick turn on and off of the tank valve.

Alfalfa Strike Indicated

CHEROKEE, Okla.—Nearly-dry Alfalfa County in northwestern Oklahoma has an indicated Mississippian discovery at Ohio Oil Co. 1 Parr.

The wildcat gaged gas at the rate of 186 M.c.f. per day on the best drill-stem test out of three taken in the Mississippian. The showing was found at 4,936-5,003 ft. Recovery was 2,950 ft. of oil, 37°-gravity. The rank test is located near the Kansas line on the northeastern flank of the Anadarko basin.

Alfalfa County has only one producing area at present, North McWillie pool. Nearest production of importance is Major County's big Ringwood field, 40 miles south. The possible hit is on a solid Ohio block which spreads through Sections 3, 4, 5, 8, 9, 10, and 17 in 28n-10w. The 1 Parr is in the SE SE NW 9-28n-10w.

Jet Fuel Line Planned

PONCA CITY, Okla.—A future connection between two refineries and the U. S. Air Force base at Wichita may have been assured by Cherokee Pipe Line Co.'s purchase of a crude line from Shell Pipe Line Co.

Negotiations are now under way with Air Force officials to permit Continental Oil Co. and Cities Service Oil Co., owners of Cherokee, to ship aviation gasoline and jet fuel direct to the base.

The purchased line between Tonkawa, Okla., and Elyria, Kans., will be converted to products. It would require only an 8-mile spur to connect it to a terminal which the companies plan to build in Wichita.

Manion to Speak

Former government aide will address A.A.O.D.C.

LOS ANGELES.—Clarence Manion, former chairman of the Commission on Inter-Governmental Relations, will be principal speaker at the banquet climaxing the fourteenth annual convention of the American Association of Oilwell Drilling Contractors. The meeting will be at the Los Angeles Biltmore, October 10-13.

Manion, a South Bend attorney, formerly served as dean of the University of Notre Dame School of Law. An advocate of decentralization of government, he headed the Commission on Inter-Governmental Relations early in the Eisenhower administration.

More than 1,000 delegates are expected at the convention. Addresses on drilling operations and management are listed below.

October 11

President's address, Karl L. Kellogg, K. L. Kellogg & Sons, Compton, Calif.; "Function of a Trade Association," Brad Mills, executive vice president, A.A.O.D.C.; "Teamwork in the Oil Drilling Industry," J. E. Toussaint, vice president, Standard Oil Co. of California.

October 12

"Instruments in Modern Drilling," Elmer L. Decker, president, Martin-Decker Corp., Long Beach; "Operation of Power Pumps in Parallel," C. C. Pitts, Loffland Brothers Co., Casper, Wyo.; Progress Report on Research Program, Dr. Ralph Simon, Battelle Memorial Institute, Columbus.

October 13

"The Drilling Contractor and Oil Industry Public Relations," S. F. Bowlby, vice president, Shell Oil Co., Los Angeles; "Relaxation of Contractural Clauses That Will Reduce the Cost of Drilling," William P. Clements, Jr., Southeastern Drilling Co., Dallas; "Progress Report on the Study of Tool Joint and Drill Pipe Wear," John Rhea, Southeastern Drilling Co.; "Safety and the Contractor," James E. Harrington, General Petroleum Corp., Los Angeles; "Planned Programs for Crooked Holes," R. J. Bromell, Great Western Drilling Co., Midland, Tex.

Grease Institute to Meet

SAN FRANCISCO. — Latest lubricating-grease manufacturing facilities will be described in a series of papers presented at the twenty-second annual meeting of the National Lubricating Grease Institute. The meeting will be at the Mark Hopkins Hotel here October 25-27.

"The New British American Grease Plant" is the topic of a paper to be presented by R. O. Rinearson, British American Oil Co., Ltd., Clarkson, Ont.

Other papers in the series include "Selection of Equipment for Successful Operation of a New Grease Plant," O. L. Yarham, Cities Service Research & Development Co., East Chicago, Ind.; "Modern Lubricants from a Modern Plant," E. L. Sutton, Pure Oil Co., Smiths Bluff, Tex.; and "Keeping Grease Manufacture Up to Date," E.W. Nelson and R. R. Trengove, Continental Oil Co., Ponca City, Okla.

L. C. Brunstrum, Standard Oil Co. (Ind.), will serve as chairman of a panel discussion on "Studies of Grease Structure—A Basis for New Developments." Panelists will include Dr. B. W. Hotten, California Research Corp., Richmond, Calif.; Dr. Ira E. Puddington, National Research Council, Ottawa; Dr. Marjorie Vold, University of Southern California; and Dr. R. H. Leet, Standard Oil Co. (Ind.).

Oil Needs To Be Discussed

DALLAS.—Dr. Arthur S. Flemming, director of the Office of Defense Mobilization, will be principal speaker at a conference on petroleum and other raw-material needs of the United States to be held here November 15-17.

The conference will be sponsored by the Dallas Council on World Affairs, headed by H. N. Mallon, president of Dresser Industries, Inc., Dallas. Flemming will discuss stockpiling for national defense.

Panel discussions will cover the supply and demand situation in oil, coal, uranium, and basic metals. Specific topics to be discussed include subsidies, depletion allowances, mineral codes, tariffs, tax structures, and the creation of a favorable investment climate abroad for American capital.

The conference will immediately precede the Dallas meeting of the Midwestern Section of the Society of Exploratory Geophysicists, to be held November 18-19.

Speakers Announced

DALLAS.—Speakers were announced last week for the thirty-fifth annual meeting of the Texas Mid-Continent Oil and Gas Association in San Antonio, October 5-6.

They include: P. C. Spencer, president of Sinclair Oil Corp. and chairman of the American Petroleum Institute; George T. Naff, president of Texas Eastern Transmission Corp.; J. C. Donnell, II, president of Ohio Oil Co.; Harry W. Bass, Dallas independent producer and drilling contractor and president of Texas Mid-Continent; E. C. Manning, premier of the province of Alberta, Canada; and Adm. Arthur W. Radford, chairman of the U. S. Joint Chiefs of Staff.

One of the highlights of the meeting will be the presentation of the association's distinguished-service award to two petroleum-industry leaders. Last year's awards went to Hines H. Baker, president of Humble Oil & Refining Co., and Amon G. Carter, Fort Worth publisher and independent producer.

Texas Program Set

A.I.M.E. section to hear secondary-recovery talks

WICHITA FALLS, Tex.—Program planning has been completed for the secondary-recovery symposium scheduled for November 17-18 in the Midwestern University auditorium here.

A dozen technical papers have been lined up for the meeting, which will be presented by the North Texas section of the American Institute of Mining and Metallurgical Engineers and sponsored by the North Texas Oil and Gas Association.

The papers and their authors are.

"Economics of Water Flooding," L. L. Brundred, Brundred Enterprises, Abilene, Tex.; "Evaluation of Reservoir Characteristics," W. L. Horner, vice president of Core Laboratories, Inc., Dallas; "Sweepout Patterns in Depleted and in Stratified Reservoirs," A. B. Dyes and P. H. Braun, Atlantic Refining Co. reservoir-engineering research department, Dallas.

"Water Source and Requirements," R. C. Earlougher and Ray W. Amstutz, Earlougher Engineering Co., Tulsa; "Water-Flood Patterns and Injection Rates," John F. Buckwalter, Ryder-Scott Co., Bradford, Pa.; "Well Completions for Water-Flood Operations," George L. Buckles, Marsh S. Watson, Jr., and Ted G. Ward, Jr., Buckles & Hostetler, Monahans, Tex.; "Design and Operation of Plants for the Preparation of Water for Injection Into Oil Reservoirs," J. Wade Watkins, assistant chief of secondary-recovery branch, U. S. Bureau of Mines, Bartlesville, Okla.

"Preparation of Water for Injection Into Oil Reservoirs," Paul D. Torrey, president of Orchem Corp., Austin; "Secondary Recovery and the Railroad Commission of Texas," William J. Murray, Jr., Texas Railroad Commissioner; "Magnolia West Burkburnett Water-Flood Project," J. W. W. Whitney, Jr., Magnolia Petroleum Co., Electra, Tex.

"Gas Injection and Water-Flood Performance, Hildreth Unit, Montague County, Texas," Ray L. Freeborn, Continental Oil Co., Wichita Falls; "Water-Flood Activity in KMA Field," Rollie Dobyns, U. S. Bureau of Mines, Wichita Falls; C. T. Burchett, Jr., Bureau of Mines, Wichita Falls. D. S. McBride, Tide Water Associated Oil Co., Kamay, Tex. J. E. Springborne, Shell Oil Co., Wichita Falls; and R. R. Darner, W. H. Hammon, Wichita Falls.

JUNK from the hole of Rough Range 1 is being examined here by the drilling crew. The Australian discovery well is drilling below 10,000 ft. after being jammed about a month by a junk basket. The hole was jammed at 9,913 ft.

Australian Gas Flows

Queensland natural-gas shows spread interest, but western area still hot as discovery well cleared, wildcat spudded

YOU need a wide-angle lens to capture the current oil scene in Australia.

The oil fever that has centered on the northwestern coast of the continent swung 3,000 miles eastward recently when gas was reported flowing from two wells in Queensland, a province that has been previously explored, but produced nothing commercial.

At the same time, the western coastal hotbed, Exmouth Gulf, remained in the limelight as fishing was completed on Rough Range 1, the discovery well of West Australian Petroleum Pty., Ltd., and the continent's first commercial producer. Another wildcat—one testing a structure believed to be 50 times the size of Rough Range—also has been spudded in this area.

Queensland . . . Australasian Oil Exploration, Ltd.'s well at Reid's Dome near Springsure encountered gas at 447 ft. The flow increased at 500 ft. and was measured at 500,050 cu. ft. a day. The gas was brought under control and drilling is being continued by Santa Fe Drilling Co. of California.

At Roma, 200 miles south of Reid's Dome, Associated Australian Oilfields has encountered a 870,000-cu. ft. gas flow in its No. 4 well. The company currently is drilling No. 5.

Tests on the gas from the two fields have not been completed, but the indications have stimulated talk of piping the gas to large Queensland cities such as Brisbane and Rockhampton.

Exmouth Gulf . . . WAPET, a Caltex subsidiary, is drilling below 3,000 ft. on Cape Range 1, the new wildcat. The well is being drilled 25 miles north of Rough Range 1.

Shortages of water in this arid, remote region 800 miles north of Perth hampered early drilling. Water had to be carted 20 miles. Two new supplies 6 miles from the rig and 5 miles apart now are furnishing the operation.

The estimated size of the Cape Range formation is the key to interest in the operation. It is believed to be 50 times that of Rough Range.

Rough Range 1, which had been jammed since August 6, is drilling below 10,000 ft. The hole was jammed at 9,913 ft. by a junk basket.

Of the two stepouts of the discovery well, one has been abandoned at 4,079 ft. as a dry hole and the second is drilling below 3,000 ft. The abandoned well, Rough Range 2, is about 3,000 ft. from the discovery while the other, Rough Range 3, is about 1,000 ft. to the northeast.

Shell Plans Probe

Western Australian permit sought for joint operation

THE Shell organization has returned to Australia and is looking for a good concession.

Shell has joined three Australian mining companies to form an exploration team. Shell controls 75 per cent of the joint operation; North Broken Hill, Ltd., 7½ per cent; Broken Hill South, Ltd., 7½ per cent; and Western Mining Corp., 10 per cent.

E. N. Avery, chairman of Shell Co. of Australia, Ltd., said the group plans exploratory work in western Australia whenever a suitable area becomes available on satisfactory terms.

Shell's announcement has created considerable interest since the group holds no exploration permits — and since much of the land under concession in western Australia comes up for renewal in October.

The general feeling is that Shell may seek to obtain some of the 325,000 square miles held by West Australian Petroleum Pty., Ltd., the Caltex subsidiary which found oil near Exmouth Gulf last November *(The Oil and Gas Journal, December 14, page 99)*. WAPET is expected to turn back some of its less attractive acreage in October.

No newcomer . . . Shell is one of several major companies that conducted unsuccessful exploration in Australia prior to the Caltex discovery. The company's Australian background dates back to 1940. Shell spent about $2 million on a 4,353-ft. hole in Queensland shortly after World War II. It was abandoned as a dry hole and Shell left Australia in 1951.

British Guiana Drilling Set

McBride Oil & Gas Corp. of British Guiana, Ltd., has announced plans to begin drilling next January on its concession in that country.

George Green, foreign exploration manager for McBride, said the first well will be drilled in the Corentyne area in Berbice County. The company has a concession covering 3,275 square miles, including the area up to 3 miles offshore.

DERBY'S MILE-LONG JETTY is being strengthened to handle the heavy loads of equipment two oil companies are shipping into the tiny northwestern Australian town as they move inland to test the Fitzroy basin.

Racing the Monsoon

Two companies speed preparations for testing Australia's Fitzroy basin before "the wet" makes country impassable

DRILLERS are racing the monsoon in one of the most remote locations ever tackled by American oil men as they try to get under way before "the wet" makes Northwest Australia virtually impassable.

The race is taking place in the Fitzroy basin, 100 miles inland from the coastal town of Derby—a tiny speck of civilization in a vast, almost uninhabited region where settlements are hundreds of miles apart.

Here, two companies—one American and one Australian—will spend more than $1 million drilling two wildcats within 6 months.

West Australian Petroleum, Pty., Ltd., will drill on Grant Range, 75 miles southeast of Derby, and Associated Freney Oilfields, N.L., will drill on the Nerrima dome, 134 miles inland in the same direction.

The companies face a common hazard—monsoonal rains known locally as "the wet," which make transportation routes virtually impassable from November to March. For the rest of the year no rain falls, but during "the wet," unformed roads are quagmires and stream crossings are nonexistent.

One of the biggest problems is the size of the territory. Western Australia, with an area of 975,920 sq. miles, is nearly four times the size of Texas. Its population is only 630,000, and all but about 35,000 inhabitants live in the area surrounding Perth in the extreme southwest corner of the state.

To reach the general area of their drilling sites, both companies are shipping stores and equipment 1,500 miles north along the western coast from Perth to Derby where a mile-long jetty has been strengthened to handle the heavy loadings.

WAPET . . . West Australian expects to spud in before the rains start. Eight American rig builders flown from the United States are now living in tents about 2 miles from the drill site while workmen build a permanent camp for other personnel.

The oil search has stirred little Derby out of decades of hot, dusty drowsiness and its population of 385 has swelled to more than 500 by the oil men. The influx is causing a local shortage of food and beer, but the Aussies say if things really get bad they'll enjoy showing Americans how to live comfortably on locally abundant kangaroos and 20-ft. pythons.

Fitzroy basin . . . The basin is a trough 300 miles long trending inland south and east from the coast at Derby. Exploration is aimed at testing domes of Permian rocks which may be underlain by Devonian and Ordovician.

Holes drilled in the 1920's revealed small quantities of oil. Outcrops are slightly petroliferous. The Devonian rocks contain many reef structures similar to those that are highly productive in Canada and Texas.

Associated Freney . . . Freney will be hard pressed to be in operation before the rains, but the company hopes to overcome its transportation problem by building an airfield at the drill site and fly in supplies when roads become useless.

WAPET has released no geological information about its Grant Range site, but Freney has published the opinions of its chief geologist, W. D. Mott, who says there is evidence to suggest that 4,000 ft. of sedimentary rocks exist in Nerrima dome beneath Permian rocks and above basement at 10,000 ft. The company plans to drill to 10,000 ft. if necessary and should spud in by early in November if equipment can reach the drill site before "the wet."

Major Discovery Claimed

An oil discovery of possible major significance is reported to have been made by Creole Petroleum Corp. in its Guanipa 2 well in eastern Venezuela.

The well is unofficially reported to have made around 1,500 bbl. daily at around 11,260 ft. The location is in the State of Monagas about 10 miles west of Pedernales on a Shell concession block.

New Cuban Well Reported

Unconfirmed reports from Cuba last week indicated that a 1,000-ft. stepout of the Cuban Jatibonico discovery well is productive.

Drilled by Kerr-McGee Oil Industries, Inc., for a group of Cuban independents, the well is northeast of the discovery. Kermac has an unexercised option to buy a 25 per cent interest in the concession.

Cuban sources last week reported tests on the second well indicated it will produce 350 bbl. daily, but this figure was discounted by more cautious observers in the United States.

Iran Ponders Oil Pact

Prime minister indicates his regime will stand or fall with agreement on revival of Iranian petroleum industry

THE Iranian Government and a group of international oil companies are moving swiftly to revive the Iranian petroleum industry under their recently announced agreement.

Acting more quickly than had been expected, the Government presented the agreement to the Majlis, lower house of the Iranian parliament, for ratification.

In a dramatic appearance before the Majlis, Gen. Faziollah Zahedi, Iranian prime minister, made it clear that his Government will stand or fall with the oil agreement.

Gen. Zahedi described the settlement as neither a concession nor a treaty but a "plan of cooperation with the great oil companies of the world." He said the Iranian industry had been shut down and its markets taken by other Middle East oil countries because of the "neglect, blunders, and self-seeking of our predecessors."

Revival of the industry, the prime minister said, is possible only through "the international help and cooperation of the big oil companies."

The Majlis voted to refer the agreement to a 36-member joint Majlis-Senate committee.

Companies get ready . . . Meanwhile, a group of engineers and technical experts arrived in Iran last week to begin a study of what equipment and materials will be needed for resumption of operations. Arrival of the group prior to ratification by the Majlis reflected the desire of the eight consortium companies to lose no time in resuming Iranian oil production.

The group of 12 was headed by L. E. J. Brouwer, an official of the Royal Dutch-Shell group.

A spokesman said the technicians were sent to Iran "so that no delay may occur in the event of the agreement being ratified."

Possible delay . . . Unless the Majlis ratifies the agreement soon, resumption of operations may be delayed somewhat.

At the time the agreement was announced, negotiators hoped the legal preliminaries and ratification could be finished in 2 months, or by early October. The agreement provides for an initial 3-month start-up period before the production minimums become effective.

Only opposition initially reported against the agreement came from a single member. This was the parliamentary ally of the religious and nationalist leader, Mullah Kashani.

Documents detailing terms of the settlement announced August 4 were signed in Teheran by Iranian Government officials. Then they were flown to The Hague, London, and New York to be formally approved by the eight international oil companies which have agreed to operate the Iranian oil industry for the next 40 years.

Before the agreement could be signed, documents had to be translated into official English and Persian texts. The terms were being studied by the U. S. Department of Justice in the light of American antitrust laws, presumably to clear United States companies involved.

The documents were rushed to Europe by chartered airplane after they were signed in Teheran by Dr. Ali Amini, finance minister, and Morteza Bayat, Iranian oil director. They were signed at The Hague by officials of Royal Dutch-Shell and the French company, Cie. Francaise des Petroles, and then in London by representatives of Anglo-Iranian Oil Co.

The agreement also has been signed by Eugene Holman, chairman of the board of Standard Oil Co. (N.J.) It was expected to be approved immediately by the four other American companies participating — Socony-Vacuum Oil Co., Inc., The Texas Co., Gulf Oil Corp., and Standard Oil Co. of California

Petrobras Takes Over Tankers

Petrobras (Cia. Brasileria de Petroleo, S.A.), the Brazilian Government's national oil monopoly, has taken over the country's state-owned tanker fleet as a part of the consolidation of oil activities under Petrobras control.

The fleet was formerly operated by Frota Nacional de Petroleiros, a federal entity under the executive branch of the government. With the transfer to Petrobras, the initials F.N.P. were removed from the ships' names, and several names changed completely.

The Brazilian flag tanker fleet amounts to around 250,000 dw. tons. Some 225,000 tons belonged to F.N.P. The F.N.P. tonnage includes 12 modern European-built seagoing tankers and nine coastal vessels built in Japan 3 years ago.

Products Balance

Exports help West Germany to avoid refining excess

SATISFACTORY exports and lower-than-anticipated runs have avoided an overproduction of oil products in West Germany.

During the first half of this year, plants in the federal republic had a total output of 3,941,006 tons, up 33.3 per cent from the first half of 1953.

During the last half of this year, production is expected to total 4,541,000 tons. This will boost the year's output to about 8,500,000 tons, or approximately 170,000 bbl. daily.

The original program of the country's refining companies called for a production of 8,930,000 tons in 1954. However, the Ruhrbau refinery at Muehlheim was closed down, and the opening of Ruhrchemie's plant at Oberhausen Holten was delayed. The resulting reduction of several hundred thousand tons has brought anticipated supply in line with total demand.

Second-quarter busy . . . Second-quarter production of the West German refineries was 14 per cent higher than during the previous 3 months. The industry produced 2,098,948 tons of finished products, processing 639,643 tons of German and 1,501,298 tons of foreign crude along with 36,779 tons of additional oil and additives. The share of German crude in the total intake was down slightly to 30.5 per cent.

Production of jet fuel rose by 74 per cent during the quarter. Production of motor gasoline increased 16 per cent, and L.P.G. 28 per cent. Lubricating-oil output rose only 6.5 per cent, and, in spite of the usual seasonal trends, fuel-oil production was 12 per cent higher than in the previous quarter.

Iraq Invites Plant Bids

Bids for the construction of a lubricating-oil plant at the Iraqi Government refinery near Baghdad have been invited by the government.

Specifications and contract documents have been drawn up by Sayid Ihsan Rifaat, head of the government's petroleum technical section. The main 25,000-bbl. daily refinery is being built at Dora on the west bank of the Tigris River and is due to come into operation in the summer of 1955. M. W. Kellogg Co. has the contract for the refinery. A 132-mile, 12-in. pipeline to move crude frome the Iraq Petroleum Co., Ltd. system to the new refinery was completed recently.

New Cuban Company Formed

Cuban American Petroleum Corp. is the latest new company to be organized to take part in the exploratory play in Cuba.

Eduardo Grenas, vice president of the company, announced in Havana that the firm expects to start drilling in October in the central part of the island. He said the company has raised $600,000 through stock sales and plans to seek a loan of $400,000 from the Cuban Government. R. Holbert, Winnsboro, Tex., will be in charge of the drilling for the company.

Directors of the new company include John Roosevelt, son of the late president, Grenas said. Chairman of the board is Joseph W. Frazer, chairman of Graham-Paige Corp., an investment firm. President is Dr. Octavio Reyes Espindola, former Mexican ambassador to Cuba. Other directors are John Jester, Dallas banker, and Newton Brozan, New York attorney.

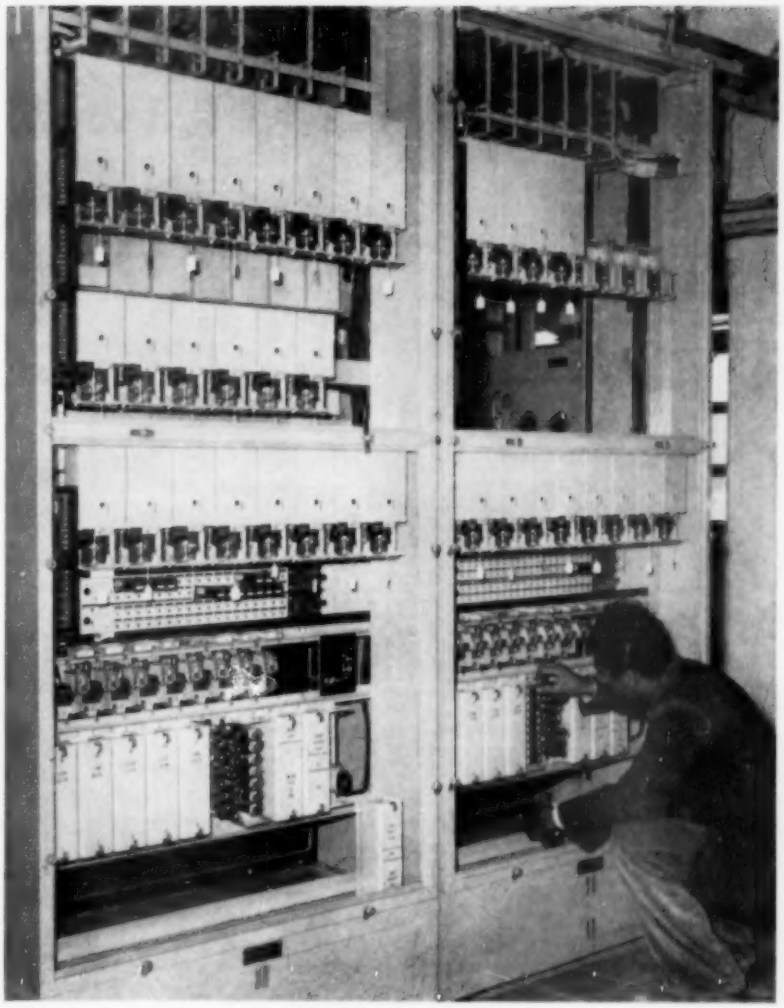
Kwinana Ahead of Schedule

Construction work on Anglo-Iranian Oil Co., Ltd.'s new Kwinana refinery near Fremantle in Western Australia is head of schedule, and the facilities are expected to be in operation next February.

The refinery will be the second of four major Australia refining projects completed. Shell brought its 25,000 bbl. daily refinery at Geelong near Melbourne on stream early this year. Other plants are under construction in Eastern Australia by Caltex and Standard-Vacuum.

The first tanker bringing crude from Kuwait is scheduled to berth at Kwinana shortly after January 1. A 2,800-ft., L-shaped jetty being built into Cockburn Sound is nearing completion. Prefabrication on shore of the concrete beams and decking has allowed work to continue despite recent storms. The jetty will accomodate three tankers simultaneously. Two dredgers have removed more than 5,000,000 cubic yards of sand in deeping a channel through two sandbanks at the entrance to the sound.

Construction of the refinery by the Anglo-Iranian subsidiary, Australasian Petroleum Refinery, Ltd., began 2 years ago. Facilities include two atmospheric distillation units with a capacity of 70,000 bbl. per stream day, vacuum distillation, fluid catalytic cracking, a Platformer, and a Hydrofiner. The production of some 2,800,000 tons of products annually will include 20,000 tons of asphalt for the Western Australian Government.



Basrah Pumping Crude by Radio

A V.H.F. radio communications system incorporating three fully automatic exchanges has been placed in operation by Basrah Petroleum Co., Ltd., in southern Iraq.

Basrah Petroleum (associated with Iraq Petroleum Co., Ltd.) operates Zubair field a short distance west of Basra and moves the production, now amounting to around 90,000 bbl. daily, to a tanker terminal on the Shatt-el-Arab through a 24-in. and a 12-16-in. pipe line.

The company's new multichannel network provides for automatic exchanges at Zubair, at the terminal at Fao, and at the company's headquarters at Makinah on the outskirts of Basra. These points are connected with three direct and three indirect telephone channels with full interdialing.

Teleprinters for general telegraph traffic have been installed between Zubair-Makinah and Mahinah-Fao, and a special teleprinter circuit is provided between Zubair and Fao solely for oil figures and oil control messages. There is also a completely separate circuit using the magneto telephone principle between Zubair and Fao for oil pumping control.

The radio equipment is fully duplicated and provides automatic changeover to standby transmitter and receiver bays in the event of failure. A radio repeater station at Seeba is unattended and has remote alarms at Makinah for power generating or radio equipment faults.

The equipment was supplied by the Automatic Telephone & Electric Co., Ltd., and British Telecommunications Research. Installation was by these companies and the B.P.C. staff.

Here's how to calculate

Flow Temperature in a Gas Pipeline

AN equation which will predict accurately the temperature of gas at any point along a transmission line has long been desired for close engineering studies of gas pipelines. The equation presented here, proved accurate by tests made on lines of Transcontinental Gas Pipe Line Corp., will be of particular value to pipeline engineers in determining flow quantities under various conditions, making economic evaluation of the desirability of installing cooling equipment, and in specifying types of pipeline coating downstream of compressor stations.

by Charles E. Schorre

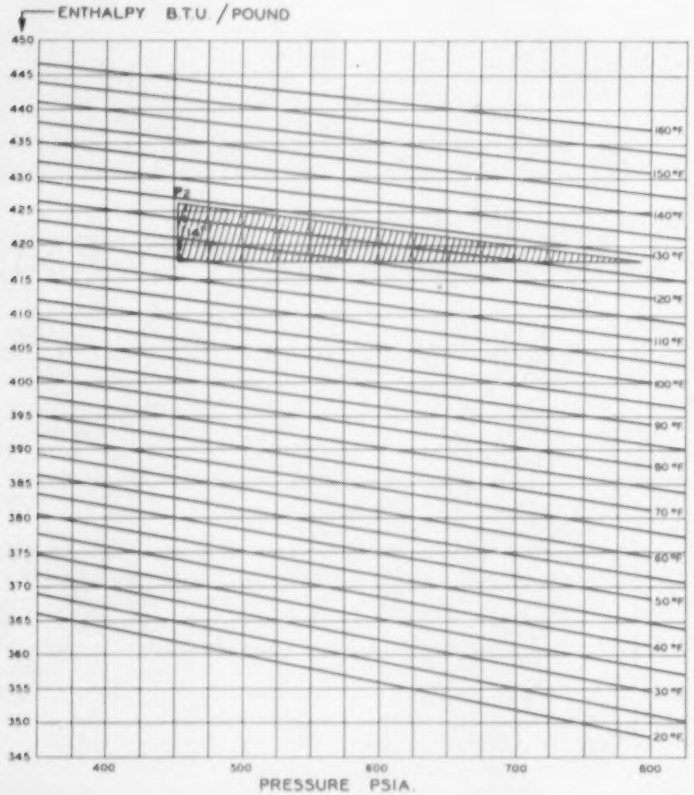
GAS temperature distribution along a buried gas-transmission line under steady-flow conditions is dependent upon three effects. They are:

1. Heat may either be conducted from the gas into the ground or vice versa, causing either a gas-temperature increase or decrease.

2. There will be a temperature decrease due to the Joule-Thompson effect, which is the change in temperature with pressure with no change in enthalpy.

3. There will be a decrease in gas temperature due to the velocity increase in the lower-pressure section of the line.

Author is engineer with Transcontinental Gas Pipe Line Corp., Houston. Portion of a paper presented at ninth annual short course in gas technology; Texas A. & I. College, Kingsville, June 2-4, 1954.



ENTHALPY VS. PRESSURE for methane. J factor may be determined from this chart by use of initial and final temperatures and pressures. Fig. 1.

In solving most gas-transmission problems it is necessary to consider only the heat transfer and Joule-Thompson effects since the temperature drop due to velocity increase is negligible in most cases. For example, on the Transcontinental pipeline the temperature drop between stations due to velocity increase is only about 0.5° F. This may be calculated if desired by using Bernouli's equation simplified to the form:

$$\frac{V_2^2 - V_1^2}{2g\,(778)} = C_p\,(T_1 - T_2) \qquad (1)$$

where:

V = gas velocity
g = gravity constant
C_p = specific heat at constant pressure
T = gas temperature

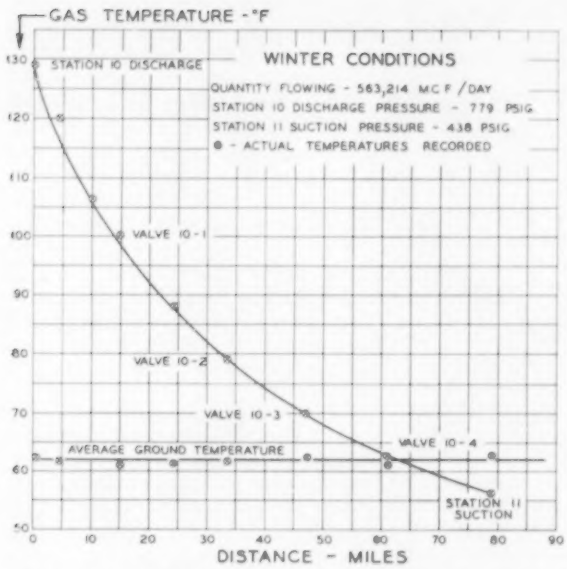
To enable the calculation of temperature distribution along a pipeline to include the above temperature effects a single equation has been derived. The equation holds true for steady-flow conditions only, i.e., if gas is being withdrawn from line pack or placed in line pack, the methods of calculation do not strictly apply. It is believed that the formula, which is presented below, has never appeared before in the published literature.

$$\mathrm{Log}_{10}\left[\frac{(T_1 + Jx_1) - (Tg + J/a)}{(T_2 + Jx_2) - (T_g + J/a)}\right] = aX/2.303 \qquad (2)^*$$

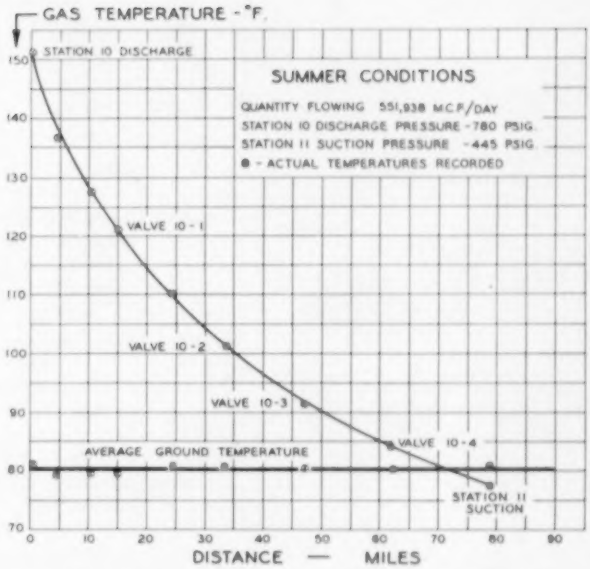
where:

J = Joule-Thompson effect, °F./ft. of pipe
x_1 = distance in feet to T_1 from initial point
x_2 = distance in feet to T_2 from initial point
$X = x_2 - x_1$, ft.
J/a = temperature difference between the ground and gas which would be necessary to hold the gas temperature constant

*Derivation of this equation may be obtained by communicating with the author.



FLOWING TEMPERATURE of gas vs. distance between compressor stations 10 and 11. Data for this curve taken under winter conditions. Fig. 2.



FLOWING TEMPERATURE vs. distance under summer conditions. Solid flow-temperature curve is a plot of the equation discussed herein. Fig. 3.

T_1 = initial gas temperature at point x, °F.
T_2 = gas temperature at point x_2, °F.
T_g = average ground temperature, °F.

$$a = \frac{2\pi RU}{q C_p} \qquad (3)$$

where:
π = 3.1416
R = pipe radius, ft.
U = heat-transfer coefficient, B.t.u./hour/°F./sq. ft.
q = gas flowing, M.c.f./hour
C_p = specific heat of gas, 24 B.t.u./°F./M.c.f.

Field data required . . . To be able to use Equation 2, it is necessary to have certain data from the operating pipeline, namely, initial and final temperatures and pressures. From these figures it is necessary to make preliminary calculations as to the value of J, the amount of Joule-Thompson effect. Also, it is necessary to determine the average ground temperature, T_g.

To determine the amount of Joule-Thompson effect on individual sections, an enthalpy-pressure-temperature chart, Fig. 1, was prepared. Using this chart, the total effect can be determined graphically if the initial and final pressures and temperatures are known. The total effect divided by the line footage gives the J factor.

To date very little has been published concerning the decrease in temperature of a gas during transmission due to the J effect and practically nothing has been said about the temperature of flowing gas decreasing below the temperature of the surrounding soil. However, almost every section of main line pipe that has been checked on the Transcontinental system has shown gas temperatures lower than the surrounding ground temperature. Figs. 2 and 3 reflect this condition for one section of our main line.

All of the gas-temperature readings were obtained by the use of thermocouples. In taking ground temperatures, thermocouple leads were placed on a probing rod and the rod was pushed into the ground to pipeline depth. On the majority of sections it was necessary to take readings at a distance of about 15 ft. from the pipeline in order to obtain a true ground temperature.

Determination of the factor U . . . Using the field data described above, the calculated value of J, and an assumed value of U for Equation 3, an initial approximation of T_2 may be calculated. In the following sample calculation the data used applies to the line section between compressor stations 10 and 11 under winter conditions, Fig. 2. J was found from Fig. 1 under the same conditions.

A value for U is assumed, a is calculated from Equation 3, and the suction temperature, T_2, at station 11 is calculated, using Equation 2. If the calculated temperature equals the actual temperature the chosen value for U is correct. If the calculated does not equal the actual temperature, a new value for U is assumed and the entire procedure duplicated.

$$J = \frac{14° \text{ F.}}{78.89 \times 5{,}280}$$

$= 3.37 \times 10^{-5}$ °F./ft. drop due to Joule-Thompson effect

Assume:
U = 0.55 B.t.u./hour/ft.²/°F.

Then using Equation 3,

$$a = \frac{2 \times 3.14 \times 1.25 \times 0.55}{\frac{563{,}214}{24} \times 24}$$

$$= 7.67 \times 10^{-6}$$

$$J/a = \frac{3.37 \times 10^{-5}}{7.67 \times 10^{-6}} = 4.39° \text{ F.},$$

equilibrium temperature between the ground and gas.

X = 78.89 miles.

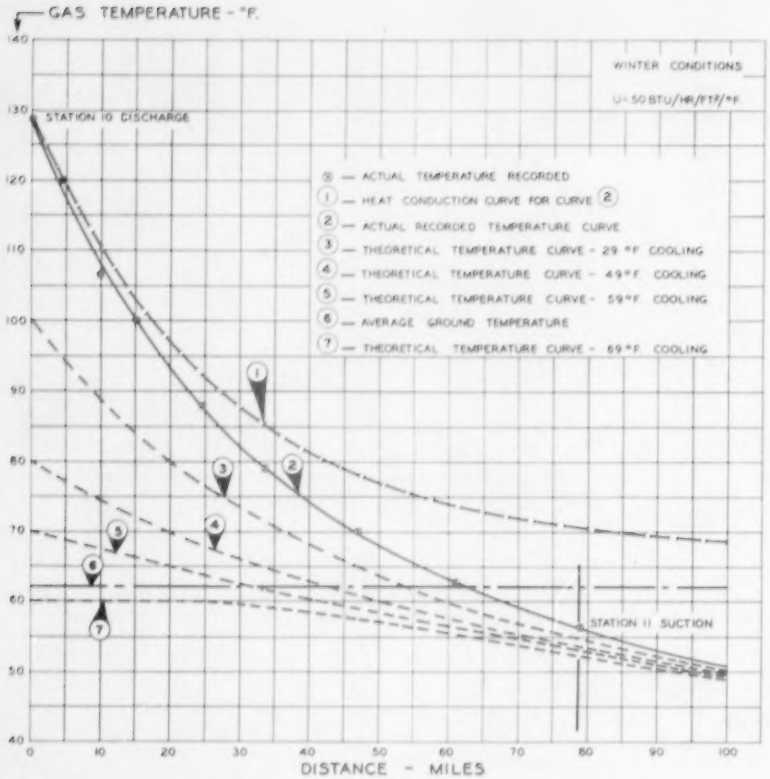
$Jx = 3.37 \times 10^{-5} \times 78.89 \times 5{,}280 = 14°$ F. Total drop due to Joule-Thompson.

$$\text{Log}_{10}\left[\frac{(129+0)-(62+4.39)}{(T_2+14)-(62+4.39)}\right] = \frac{7.67 \times 10^{-6} \times 78.89 \times 5{,}280}{2.303}$$

$$T_2 = 54.9° \text{ F.}$$

The value assumed for U is incorrect since the actual recorded temperature at station 11 is 56° F.

Assume another value of U and recalculate:


GAS TEMPERATURE - °F.
WINTER CONDITIONS
U = 50 BTU/HR/FT²/°F
STATION 10 DISCHARGE
② — ACTUAL TEMPERATURE RECORDED
① — HEAT CONDUCTION CURVE FOR CURVE ②
② — ACTUAL RECORDED TEMPERATURE CURVE
③ — THEORETICAL TEMPERATURE CURVE - 29 °F COOLING
④ — THEORETICAL TEMPERATURE CURVE - 49°F. COOLING
⑤ — THEORETICAL TEMPERATURE CURVE - 59°F. COOLING
⑥ — AVERAGE GROUND TEMPERATURE
⑦ — THEORETICAL TEMPERATURE CURVE - 69°F. COOLING
STATION 11 SUCTION
DISTANCE - MILES

GAS FLOW TEMPERATURE vs. distance for various degrees of gas cooling at the discharge station. Fig. 4.

$$U = 0.50$$

$$a = \frac{6.28 \times 1.25 \times 0.5}{\frac{563{,}214}{24} \times 24}$$

$$= 6.98 \times 10^{-6}$$

$$J/a = \frac{3.37 \times 10^{-5}}{6.98 \times 10^{-6}} = 4.83^\circ \text{ F.}$$

$$\text{Log}_{10}\left[\frac{(129+0)-(62+4.83)}{(T+14)-(62+4.83)}\right]$$

$$= \frac{6.98 \times 10^{-6} \times 78.89 \times 5{,}280}{2.303}$$

$$T_2 = 56.2^\circ \text{ F.}$$

Since this compares favorably with the actual suction temperature the correct value of U is 0.50 B.t.u./hour/ft.²/°F.

Double-check value of U . . . As an additional check on the correctness of the value assigned U, let X, the distance, vary, and compare calculated temperature with measured temperature at the point x_2.

Assume X = 40 miles

then: $JX = 3.37 \times 10^{-5} \times 40 \times 5{,}280 = 7.12^\circ$ F.

$$\text{Log}_{10}\left[\frac{(129+0)-(62+4.83)}{(T_2+7.12)-(62+4.83)}\right]$$

$$= \frac{6.98 \times 10^{-6} \times 40 \times 5{,}280}{2.303}$$

$$\text{Log}_{10}\left[\frac{62.2}{(T_2+7.12)-66.83}\right]$$

$$= 0.640$$

$$\left[\frac{62.2}{(T_2+7.12)-66.83}\right] = 4.36$$

$$T_2 = 73.9^\circ \text{ F.}$$

The actual temperature at this point (see Fig. 1) is 74° F.; thus the validity of U is verified.

After U has been established, it can be used to determine a gas temperature at any point on the pipeline section for any quantity flowing and any temperature condition. However, U is subject to variation due to soil conditions, which probably will vary over a period of time, and may introduce an error into the temperature prediction.

For the section of line shown in Fig. 2, the U value has varied as much as 20 per cent between the various times that it has been checked. The soil in this section is a mixture of red clay, rock, and sand and, for the most part, the soil at pipeline depth is dry.

Economics of gas cooling . . . Figs. 2 and 3 illustrate temperature distribution along the pipeline where the gas has not been cooled. Fig. 4 illustrates the various temperature distribution curves that would exist if gas cooling were employed at compressor station 10. Curve 1 is a temperature distribution curve resulting from heat transfer by conduction and is based upon curve 2. Curve 2 is a curve of actual recorded temperatures between stations 10 and 11. The actual mean flowing temperature from this curve is 80° F. Curve 3 reflects 29° F. of gas cooling at station 10. The theoretical mean flowing temperature using curve 3 is 70.9° F. or a reduction in mean flowing temperature of 9.1° F. This 9° F. reduction in mean flowing temperature results in less than 1 per cent increase in capacity.

Curves 5 and 7 reflect additional gas cooling in an amount that is certainly past an economical point but is shown as a matter of illustration. Curve 7 is an interesting curve since we have assumed that the gas would be cooled to 60° F. which is 2° F. less than ground temperature. This curve shows that the Joule-Thompson effect has more effect upon the flowing temperature than the heat transferred by conduction from the ground to the gas. The total effect that curve 7 had upon station 11's suction temperature was 4° F. It can be noted that the change in suction temperature in proportion to the amount of cooling was of a small magnitude.

There has been much said about the economics of gas cooling and some gas-transmission systems have cooling while others do not. Transcontinental has gas-cooling facilities in all but three compressor stations and cools the gas approximately 35° F. This cooling lowers the mean flowing temperature approximately 11° F. The final decision to either install or delete gas cooling on a gas-transmission system is dependent upon economics. However, it is an important consideration in the design of gas-transmission system and should be studied completely.

Reference

1. Dunkle, R. U., "Predicting Temperature Distribution Along Gas Transmission Pipelines," Gas (September 1942), p. 31.

Redwood Steam Treaters Save Important Money

. . . by ending scale-removal costs

by Ralph W. Hill

Between $50 and $115 per month was spent to remove scale deposition like this in each indirect heater.

REPLACEMENT of conventional steel treaters with redwood steam treaters has virtually eliminated costs of treater corrosion and scale removal for Stanolind Oil & Gas Co. in fields where corrosion and scaling are severe.

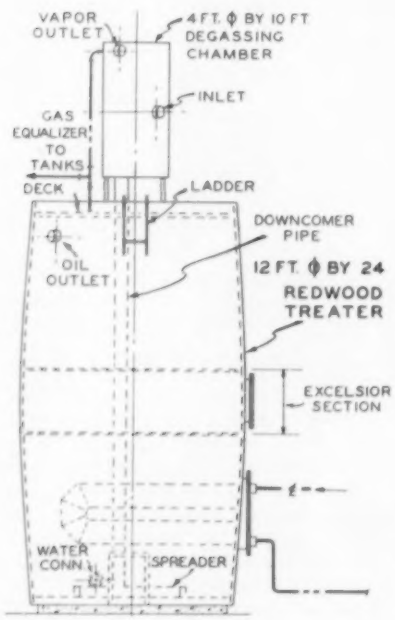
Costs with steel treaters had amounted to an average $74 per month per treater or 1.7 cents per barrel of oil treated. Where indirect heater-redwood settling tanks were replaced with redwood steam treaters, savings in scale-removing costs of between $50 and $115 per month for each installation were noted.

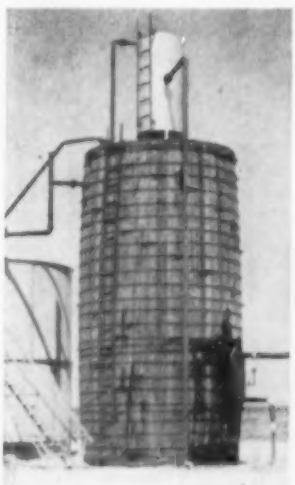
The problem . . . The two fields in which corrosion and scale formation are most severe in Stanolind's operations are Midland Farms and Goldsmith fields in West Texas. The hydrogen sulfide content of the gas is as high as 5,000 grains per 100 cu. ft. of gas. Scale formation is so rapid that in 5 weeks a 3-in.-diameter indirect-heater tube bundle will diminish to 1 in. Corrosion is so severe that steel treater shells have been eaten through in a period as short as 9 months.

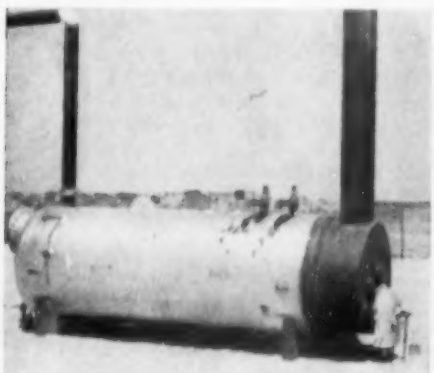
With steel treaters . . . When the fields were brought in approximately 10 years ago, conventional vertical steel treaters were installed to dehydrate the crude oil. Decreased heating capacity as a result of scale formation on the fire tube soon necessitated fire-tube removal and descaling. The combination of corrosion and scale formation resulted in frequent fire-tube burnouts and collapse.

A regular inspection and scale-removal schedule was set up as a preventive-maintenance measure. In addition, use of corrosion inhibitors and chemicals for the inhibition of scale formation was initiated. Later on, a magnesium anode was developed for use in treaters, but by that time the problem had reached such proportions that it was decided to replace the steel treaters with indirect heater-settling tank installations.

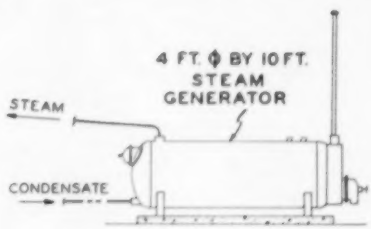
At that time the cost of corrosion and scale formation in the steel treaters amounted to an average of $74 per month for each installation, or 1.7 cents per barrel of oil treated. This included cost of scale removal, repair and replacement of fire tubes, repair of treater shells, and increased amortization cost due to shortened treater life as a result of corrosion. Due to corrosion, treater life was from 2 to 5 years, whereas in a noncorrosive field







Thirteen installations of the redwood steam treater and steam generator have been made on Stanolind leases in Midland Farms and Goldsmith fields of West Texas.



"During the past 3 years, 13 redwood steam treaters have been installed on new leases. . . There has been no expense attributable to corrosion and scale to date, except for some improvements in design which were of very minor nature."

economic studies have produced conservation estimates of 15 years.

Indirect Heater-Settling Tank Installations

The indirect heater-settling tank combination, which replaced the steel treaters, consisted of a gas-fired heater with cast-iron coils through which the emulsion passed. The coils were surrounded by water heated by a fire tube. Emulsion from the heater flowed to a redwood settling tank 16 to 20 ft. in diameter by 24 ft. high, located 150 ft. away for safety reasons. The only trouble encountered in this type installation was due to corrosion of the 150-ft. hot-oil line from the heater to the settling tank. Experiments were conducted with plastic-lined and all-plastic pipe for these lines, but no entirely satisfactory solution was found.

The big difficulty was the formation of scale in the cast-iron tubes in the indirect heater. The scale consisted of iron sulfide, sulfate, and phosphate, and as treatment with caustic was not effective, the tubes had to be drilled out mechanically. The cost of cleaning the heater tubes in this manner was as high as $320. Scale-removal cost ran from $50 to $115 per month for each installation.

The Redwood Steam Treater

Because conventional equipment had thus failed to solve the problem of corrosion and scale formation it was decided to forget conventional equipment and design treating equipment with the reduction or elimination of corrosion and scaling problems as the prime consideration. Corrosion-resistant clad steel and plastic-coated steel were considered. Clad steel was eliminated due to cost and fabrication difficulties. In the case of plastic-coated steel, lack of a proved long-life coating suitable for high temperature caused it to be rejected. It was then decided to design a treater of redwood, adhering as closely as possible to the design of the highly efficient steel treater.

To reduce skin temperature of the emulsion-exposed surface of the heating element, a steam-heated heat exchanger was selected for heating the emulsion. Both monel U-tube-type and cast-iron coil-type heat exchangers are now being used in the redwood vessel with satisfactory results. A standard steam generator, located 150 ft. away from the treater for safety reasons, furnishes steam to the heat exchanger inside the redwood treater. An excelsior section is provided, with a method for supporting it without the use of cribbing, but still allowing for the reduction in vessel diameter that occurs with periodic hoop tightening. A downcomer pipe of asbestos cement and a spreader at the bottom of the treater are similar to the internals in the conventional steel treater.

It was not possible to incorporate a gas separation section in the top of the redwood vessel as in a steel treater, so a galvanized 3 or 4-ft. diameter by 10-ft. "degasser" on top of the redwood vessel is utilized to separate the solution gas that evolves as a result of pressure reduction at the separator. This degasser is particularly necessary in fields where the oil is foamy, as considerable difficulty had been encountered in attempting to use an extended flume rather than the relatively large-diameter degasser. Since the fluid in the degasser is not heated, corrosion of the degasser has not been a problem.

During the past 3 years, 13 redwood steam treaters have been installed on new leases in Midland Farms and Goldsmith fields. There has been no expense attributable to corrosion and scale formation to date, except for some improvements in design which were of a very minor nature. The standard sizes for these treaters are 8-ft. diameter by 24 ft. high, 500,000 B.t.u. capacity; 10-ft. diameter by 24 ft. high, 750,000 B.t.u. capacity; and 12-ft. diameter by 24 ft. high, 1,000,000 B.t.u. capacity.

The treating capacity of these redwood steam treaters is approximately the same as that of the high-capacity-type steel treater 4 ft. smaller in diameter in each case. For example, the 10-ft. diameter redwood steam treater has approximately the same capacity as a 6-ft. diameter high-capacity vertical steel treater.

Although the installed cost of a steel treater is appreciably less than that of either the indirect heater-settling tank combination or the redwood steam treater, the monthly cost or cost per barrel of oil treated in a steel treater is greater. On the other hand, the installed cost of the redwood steam treater is appreciably less than that of the indirect heater-settling tank combination, and in addition, the operating costs attributable to corrosion and scale formation are eliminated.

A typical comparison of installed costs for equipment of approximately the same capacity is as follows:

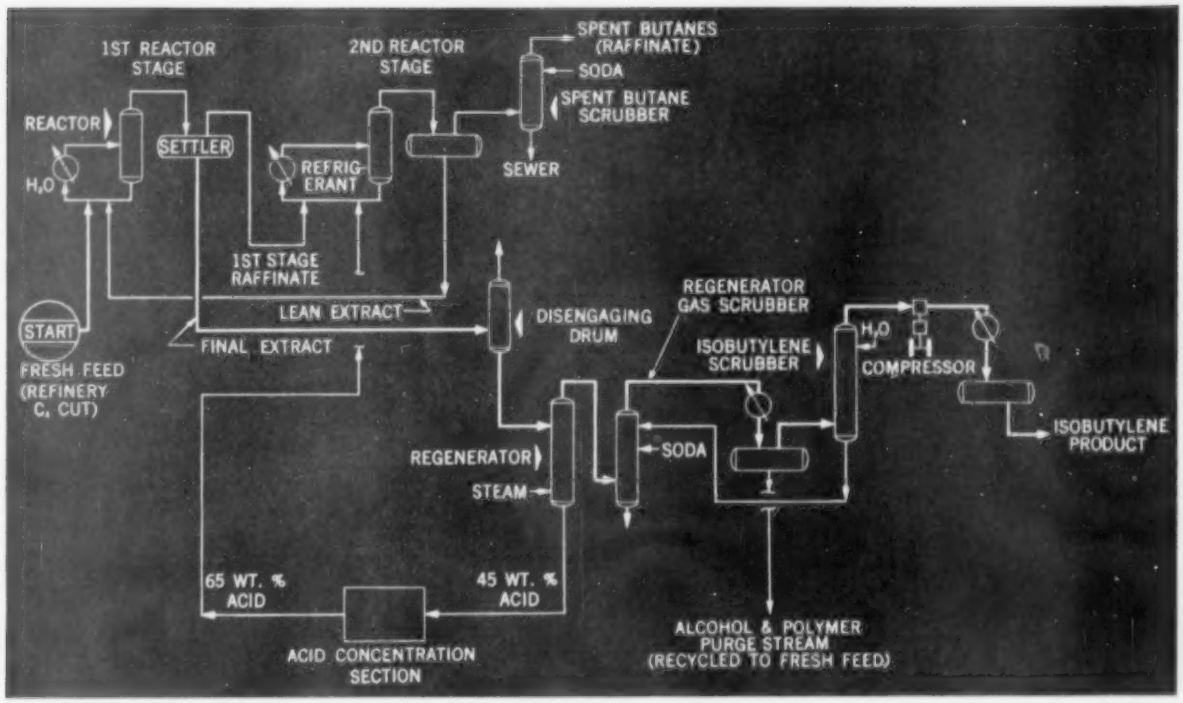
Type treating equipment and description—	Installed cost
Steel treater:	
6-ft.-diameter by 27½-ft.-high capacity type	$4,150
Indirect heater-settling tank:	
6-ft.-diameter by 10-ft. indirect heater, and 16-ft. diameter by 24-ft. settling tank	8,210
Redwood steam treater:	
10-ft.-diameter by 24-ft. treater 750,000 B.t.u. steam generator	6,360

For the 13 redwood steam treaters which have been procured to date, a saving of approximately $23,140 has been effected in scale-removal costs that would have been required had indirect heater-settling tank equipment been installed on these leases.

Scale like this in a heater tube and return bends formed so rapidly that in 5 weeks a 3-in.-diameter indirect-heater bundle diminished to 1 in.

THE AUTHOR

Ralph W. Hill is senior mechanical engineer with Stanolind Oil & Gas Co., Tulsa. Upon receiving a B.S. from University of Minnesota in 1931, he went with Moorhill Gas Co., Paola, Kans., as field engineer. After 2 years as production superintendent for Mills Oil, Inc., of West Branch, Mich., he joined Jarecki Manufacturing Co. as design engineer at Tulsa in 1937. He spent 3 years with the U.S.A.F. and joined Stanolind in 1946 as mechanical engineer in Tulsa.



SCHEMATIC FLOW PLAN shows how isobutylene is manufactured by the combination sulfuric acid extraction-regeneration method. Fig. 1.

PETROCHEM REPORT:

Separation of Isobutylene . . .

Manufacture of refinery C_4 cut by extraction-regeneration process

by G. P. Baumann and M. R. Smith

THE manufacture of isobutylene consists of extraction of isobutylene with 65 per cent by weight of sulfuric acid and regeneration to separate the isobutylene from the acid. These reactions are carried out under specific operating conditions so as to enhance the desired reactions at the expense of undesired side reactions. The combined extraction - regeneration process was developed by Standard Oil Development Co., and has been practiced commercially since 1942. It is available to the industry under appropriate licensing arrangements.

Butyl and GR-S rubber . . . The principal impetus for the development of this process was great demand for synthetic rubber prompted by World War II. Its principal application has been the production of feed stocks for synthetic rubber manufacture — the isobutylene for butyl rubber (a high molecular-weight copolymer of isobutylene and isoprene), the isobutylene-free raffinate for buna-S (GR-S) rubber. The raffinate is generally concentrated by normal or extractive distillation prior to dehydrogenation of n-butylenes to produce butadiene.

The original commercial isobutylene manufacturing plants built through affiliates of Standard Oil Co. (N. J.), are part of United States and Canadian government - owned synthetic - rubber plants. The most recent plant built by an affiliate of Standard is located at the Bayway (Linden, N. J.) refinery of Esso Standard Oil Co. It started up in August 1953.

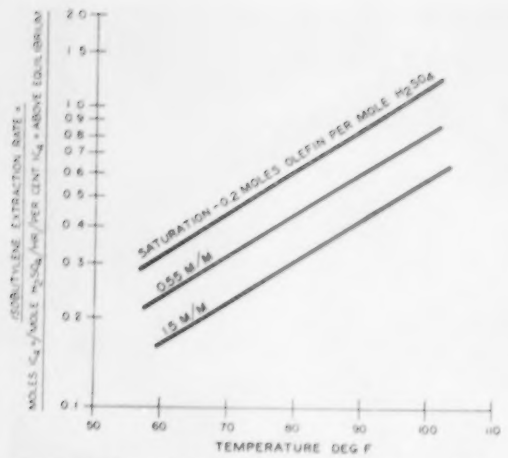
Authors are with Standard Oil Development Co., Linden, N. J. Paper presented at nineteenth mid-year meeting (Refining Division) of A.P.I.

Description of Process

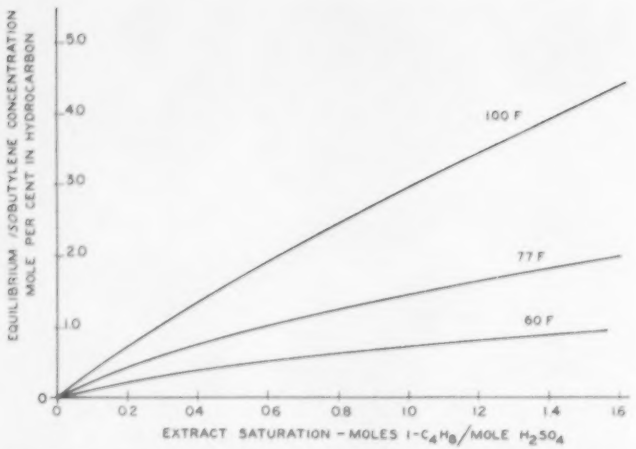
The two critical requirements for design and operation of an isobutylene plant are yield and selectivity. A high yield of isobutylene is important from the point of view of maximizing utilization of available isobutylene. In cases where the raffinate is used for secondary butyl alcohol manufacture it is necessary to produce an essentially isobutylene - free raffinate; thus a high yield of isobutylene is important, in that it reflects a high degree of removal (or cleanup) of isobutylene from the raffinate.

Selectivity refers to the preferential absorption of isobutylene while the absorption of normal butylenes is minimized. Absorbed normal butylenes would be released with the isobutylene in the regeneration section and would show up as an impurity in the final product.

Side reactions . . . Effects which have an adverse effect on yield and/or selectivity are:



EQUILIBRIUM CURVES for isobutylene in hydrocarbon and in extract containing 65 per cent by weight of sulfuric acid. Fig. 2.



SPECIFIC EXTRACTION RATE for isobutylene in 65 per cent by weight sulfuric acid. Fig. 3.

1. Absorption of n-butylenes.
2. Formation of polymers in either the extraction or regeneration steps.
3. Loss of tertiary butyl alcohol in the raffinate.
4. Regeneration of tertiary butyl alcohol as such (the alcohol is recycled, and too great a recycle stream could reduce plant capacity).

Operating conditions are selected so as to minimize the foregoing.

The basic steps in the manufacture of isobutylene using sulfuric acid are the following:

1. Extraction.
2. Regeneration.
3. Scrubbing and compression.
4. Acid concentration.

Each of these steps is shown schematically in the simplified flow plan in Fig. 1. In the extraction section fresh feed is contacted countercurrently in two stages with 65 per cent by weight of sulfuric acid. Spent butane (raffinate) is withdrawn from the second stage, and final rich extract from the first stage. Extract is fed to the regeneration system, where it is diluted to 45 per cent and heated. Isobutylene is regenerated as a gas at low pressure. The 45 per cent acid is reconcentrated to 65 per cent, and then is cooled and recycled to the extraction section. The isobutylene gas is scrubbed with caustic, cooled to condense alcohol and polymer, water-washed to scrub out traces of alcohol, and then compressed and condensed.

Extraction

The feed stock is a closely fractionated liquid butane-butylene stream which is treated with 65 per cent by weight of sulfur acid for preferential chemical extraction of isobutylene. The hydrocarbon and acid are intimately mixed and allowed to settle into two phases; the upper phase is the raffinate (spent butanes), and the lower phase is the acid extract.

The amount of isobutylene extracted, and its subsequent purity, are primarily fixed by the extraction conditions. The important variables are:

1. Acid strength.
2. Temperature.
3. Holdup time.
4. Extract saturation (moles of isobutylene per mole of 100 per cent sulfuric acid).
5. Isobutylene content of feed.
6. Number of treating steps.
7. Mixing intensity.

Acid strength . . . This is maintained at 65 per cent by weight. Higher acid strengths decrease selectivity, increase loss of isobutylene to polymer, and unduly raise the acid-reboiler duty. Lower strengths greatly increase corrosion of steel equipment. Temperature is important because an increase in temperature increases the equilibrium concentration of isobutylene in the raffinate, both as isobutylene and tertiary butyl alcohol. A rise in temperature increases the extraction rate of both isobutylene and normal butylenes, and also increases the rate of polymer formation.

Inasmuch as the rate of extraction is a function of temperature and extract saturation, holdup must be sized to allow sufficient time for the necessary reaction to be carried out. The extraction rate is also a function of mixing intensity. Adequate mixing is readily provided by well-known methods. Final extract saturation is important in setting the acid rate and, hence, in sizing the acid-concentration facilities. A high-extract saturation is desirable in minimizing acid rate. However, it results in a larger amount of isobutylene in the raffinate.

Cleanup and extraction . . . Fig. 2 shows the equilibrium relationship between extract saturation and isobutylene concentration in the raffinate for parameters of temperature. Thus it can be seen that high cleanup of isobutylene can be obtained only at low temperatures or with low extract saturation. Fig. 3 shows the relationship of temperature on isobutylene-extraction rate for parameters of extract saturation. This relationship shows that high temperatures are necessary to have relatively fast extraction rates. Thus high cleanup and high extraction rates cannot be carried out simultaneously in one reaction stage in order to produce an extract of high saturation. However, a two-stage process, which is operated countercurrently with the second stage operating at a lower temperature, will produce high cleanup; whereas the first stage, operated at higher temperature, gives high final extract saturation and relatively high extraction rates.

The phase distribution for tertiary butyl alcohol, which is present in the extraction system, follows a pattern similar to isobutylene. Higher temperatures and extract saturations give greater concentration of tertiary butyl alcohol in the spent butanes. By withdrawing final raffinate from the low temperature-low saturation stage, loss of isobutylene as alcohol in the raffinate is minimized. Under normal conditions the alcohol content of the raffinate will be on the order of 0.1 per cent by liquid volume.

Although the equilibrium absorption of n-butylenes is relatively high, the extraction rates of n-butylenes average about one-sixtieth of that of isobutylene. Excess holdup time is avoided so as to limit the amount of n-butylene extracted.

Polymer loss with the spent butane amounts to about 1 per cent by liquid

volume of the raffinate stream. Some of this is formed within the extraction system, the amount increasing with increased temperature and holdup time. The remainder is formed in the regeneration step, and is returned to the extraction section by a purge stream which will be referred to later.

Two-stage operation . . . In this, as shown in Fig. 1, fresh feed and lean extract (approximately 0.5 saturation) are fed to the first stage, which is maintained at a temperature of approximately 100° F. Heat of reaction is removed by cooling water. The resulting rich extract (approximately 1.5 saturation) formed in the first stage is sent to the regeneration step. The partly spent hydrocarbon phase is cooled and extracted with 65 per cent by weight of sulfuric acid, at a temperature of approximately 55° F. to 75° F., to remove essentially all but the equilibrium amount of isobutylene in the hydrocarbon phase. This temperature is maintained by refrigeration. The resulting lean extract is pumped to the rich extract stage. Before it is sent to storage, the final raffinate is caustic-washed for removal of entrained acid and acid formed by breakdown of acidic compounds.

Refrigeration

The final acid extract from the extraction section is degassed, and then is fed to the regenerator. In the regenerator three reactions can be carried out, depending on operating conditions, as follows:

1. Isobutylene in extract to isobutylene.
2. Isobutylene in extract to tertiary butyl alcohol.
3. Isobutylene in extract to dimer and trimer polymers.

High yield . . . Under proper conditions the first reaction predominates, and 90 per cent of the isobutylene in extract can be regenerated as isobutylene on a once-through basis. Recirculation of alcohol and polymer is normally carried out so that the over-all yield of isobutylene is 95 per cent. This high yield is obtained because alcohol will enter the extract phase, and isobutylene can then be regenerated as mentioned previously. Thus only a very small amount of isobutylene leaves the unit as alcohol. However, the dimer and trimer do not convert back to isobutylene, and isobutylene converted to polymer in the extraction or regeneration step is lost as such.

The principal process variables in regeneration are:

1. Pressure.
2. Bottom temperature.
3. Acid strength.

Optimum pressure is close to atmospheric. Lower pressure favors the production of alcohol, and higher pressure favors the production of polymer. In general, polymer formation increases with increasing temperature. Increasing the strength of the acid increases polymer formation; decreasing the strength of the acid favors alcohol production, and also increases the heat load of the acid concentrator unduly. All these variables are interrelated; for example, a change in either acid strength or pressure affects operating temperature.

Steam added to the regenerator bottoms has the following functions:

1. Dilute the acid to 45 per cent by weight.
2. Heat the acid.
3. Provide heat for the endothermic regeneration reactions.
4. Strip reactants and reaction products from the acid.

Adjust steam . . . Amount of steam is adjusted to provide necessary heat and water balance so that amount of steam in the overhead vapors is minimized. The concentration of steam in the overhead vapors sets the temperature, and also the effective hydrocarbon partial pressure under which the isobutylene is regenerated. The presence of excessive steam in the overhead vapors lowers the hydrocarbon partial pressure, and has the same effect as lowering total pressure on the system.

The regeneration tower may be packed or constructed with trays. Although the rate of regeneration is not instantaneous, the use of trays provides sufficient holdup time for completion of the reactions. The amount of hydrocarbon in the acid bottoms is normally zero to a trace amount.

Scrubbing and compression . . . The vapors which leave the top of the regenerator contain the following:

1. Steam.
2. Isobutylene.
3. Tertiary butyl alcohol.
4. Polymer.
5. Acid mist.
6. Traces of n-butylene and secondary butyl alcohol.

These vapors are first scrubbed with hot caustic soda solution to remove acid mist. Vapors from the caustic scrubber are then cooled to condense most of the alcohol and polymer. This condensate, an alcohol-polymer-water solution, is returned to the extraction section. The remaining vapors disengaged from this condensate are fed to a final water scrubber for cleanup of alcohol. The isobutylene vapors from this scrubber are compressed, and then condensed.

Acid concentration . . . The regenerator-bottoms liquid is boiling sulfuric acid (strength, 45 per cent by weight), and it is gravitated to the acid reboiler where water is evaporated to increase the acid concentration back to 65 per cent by weight. This operation can be carried out in an atmospheric or vacuum acid reboiler. The hot 65 per cent acid is cooled, and then pumped to the lean (second) stage reactor—thus completing the cycle.

The acid to the concentrator contains a very small quantity of hydrocarbon. Because the acid is at relatively high temperature in the concentrator, there is some breakdown of hydrocarbon to form carbon. The carbon buildup should not be allowed to become excessive.

Feed and Products

The feed stream to the unit is a well-fractionated butane - butylene refinery cut. For this feed stock and a two-stage extraction step, 85 per cent of the isobutylene in the feed has been extracted and regenerated to isobutylene.

TABLE 1—TYPICAL FEED AND PRODUCT STREAM ANALYSES

Stream—	Feed	Isobutylene	Spent butanes
Component, (liquid vol.) per cent:			
Propane-propylene	2.0	0.0	2.3
n-Butene-1	11.0	0.4	12.6
cis-Butene-2	10.0	0.5	11.4
trans-Butene-2	7.0	0.4	8.0
Isobutylene	14.0	96.0	1.2
n-Butane	23.0	0.6	26.1
Isobutane	31.0	0.1	35.4
$C_{5}+$	2.0	2.0	3.0
Total	100.0	100.0	100.0

TABLE 2—ECONOMIC DATA ON ISOBUTYLENE MANUFACTURE

(Product is 96 per cent by liquid volume pure isobutylene)

Plant capacity:	
Isobutylene product, short tons per calendar day	80
Feed, bbl. per calendar day	6,300
Spent butanes, bbl. per calendar day	5,550
Plant investment, onsite*	$2,000,000
Plant service factor, per cent	90
Operating labor, men per shift	3
	Per bbl. of feed
Chemicals:	
Sulfuric acid (strength, 100 per cent), lb.	0.25
Caustic soda (strength, 100 per cent), lb.	0.15
Propane, gal.	0.05
Utilities:	
Steam (from and at 212° F.), lb.	90
Power, kw.-hr.	4
Cooling water (at a temp. of 87° F.), gal.	700
Fresh water (condensate), gal.	5

*Gulf Coast location; investment includes refrigeration facilities.

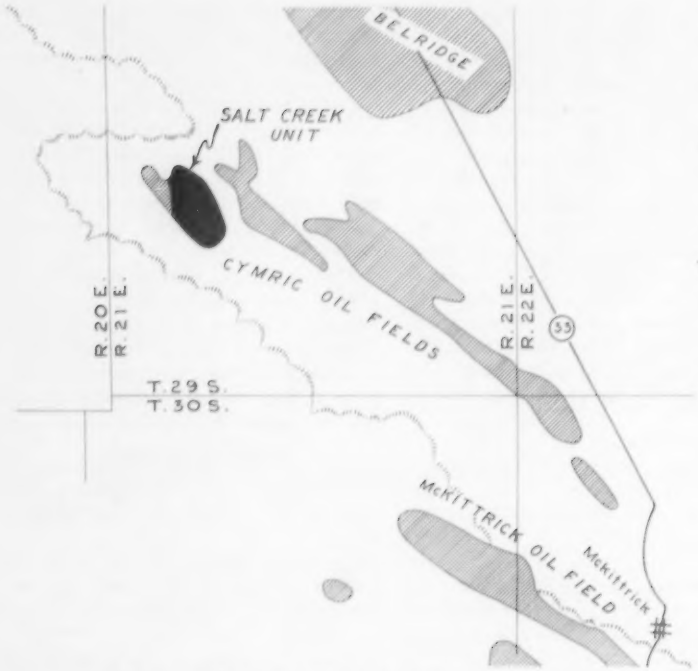


Fig. 1—Index map of the Salt Creek Carneros Unit.

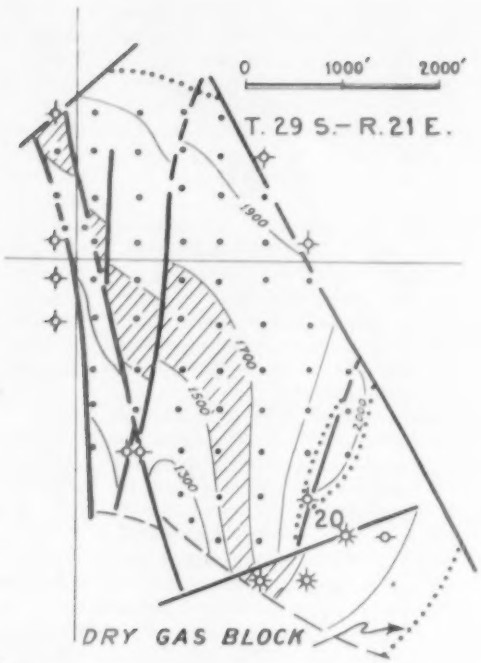


Fig. 2—Contour top sand at 200-ft. intervals.

GAS INJECTION IMPROVES RECOVERY

...of Salt Creek's low-gravity oil

by Holmes Miller

UNITIZATION and pressure maintenance by gas injection in the Carneros Pool Unit of Salt Creek field in Kern County, California, has two important results. First, control of gas-oil ratios has allowed maximum benefits from gravity segregation. Second, injection has minimized irregular water encroachment, thereby taking advantage of a natural water drive without serious bypassing of producible oil.

The field is located approximately 20 miles northwest of Taft in western Kern County; and the Carneros sand, which is lower Miocene or Saucesian stage, is the only producing sand in the unit.

Structurally, Salt Creek field is fairly complicated. It is an anticlinal nose plunging to the southeast and bisected by numerous faults making it in reality a fault-block reservoir. Closure is also effected by the pinchout of the Carneros sand. Fig. 2 shows the structure contour on top of the sand and the faults effecting the accumulation. Fig. 3 shows an east-west cross-section through the center of the field. There is as much as 880 ft. of closure in the main fault block and dips are as high as 30°.

The north-trending fault on the west of the field has a displacement of approximately 250 ft. and forms a seal on the high side of the structure. Paralleling this and approximately 300 ft. to the east is a second fault which forms a pressure barrier between a narrow productive block and the main producing block.

To the north, the reservoir is bounded by a thrust fault trending north-east and by edge water at 2,100 ft. subsea. The eastern boundary is a normal fault striking northwest and also edge water at 2,050 ft. subsea.

The oil-producing blocks are bounded on the south by a normal fault striking northeast and by the pinchout of the Carneros sand. South of the fault is a small dry-gas block closed by the pinchout to the southwest and by a water table at 2,020 ft. subsea.

Rapid development . . . The field was discovered by Intex Oil Co. 2 Tremblor on March 8, 1946, which flowed initially 430 bbl. per day of 17°-A.P.I.-gravity oil. Rapid development followed this discovery throughout 1946 and 1947 until a total of 63 producing wells had been completed. Three of these were gas wells in the dry-gas block at the south end of the field. Only two wells required pumping equipment upon completion. Thirteen dry holes delineate the productive area. This high percentage of failures is indicative of the complexity of the structure.

There are approximately 270 oil productive acres developed on 4.4-acre spacing. The dry-gas block contains approximately 44 acres with three wells. Well depths vary from 2,150 to 3,000 ft. depending upon structural position.

Author is with Intex Oil Co., Bakersfield, Calif. Paper presented at 1954 meeting of Pacific Coast District, A.P.I. Division of Production, Los Angeles.

Sand thicknesses vary from 0 to 222 ft. with an average of approximately 130 ft.

The majority of the wells were completed with 7-in. casing cemented on top of the Carneros after penetrating the entire pay section. Slotted liners were hung through the sand. Nine wells were completed with 7-in. combination strings. Gravel-packed liners were used in 10 wells and 5 wells were completed through gun-perforated casing.

Unitization came early . . . Negotiations towards unitization were started early in the development life of the field. Much credit is due the managements of the various companies for their efforts and persistence in finalizing the unit October 1, 1948, only 2½ years after discovery and a year after development had been completed.

The following companies participated in the unit: Intex Oil Co., Superior Oil Co., Richfield Oil Corp., The Texas Co., Oceanic Oil Co., Union Oil Co. of California, and Standard Oil Co. of California.

Prior to unitization, voluntary allocation of oil production and restriction of high gas-oil ratios were practiced by the individual operators. Allocation was based upon preliminary estimates of oil sand volumes.

By the time the unit was consummated, there were only 18 flowing wells. Nine wells were shut in because of high gas-oil ratio, and one was flooded out by water. The remaining wells had been placed on the pump. As of the first of 1954, three wells were still flowing and four pumpers had been returned to a flowing condition due to proximity to injection. Seven wells were shutin because of high gas-oil ratios, four had been converted to injection wells, and four were flooded out by water.

The prime purpose of unitization was to initiate gas injection for pressure maintenance. Two compressors were installed and gas injection was started in the latter part of December 1948. Carneros gas contains only 0.22 gal. of casing-head gasoline per M.c.f., consequently, a liquid recovery system is not practical. The two 300-hp. compressors have a capacity of 2,750 M.c.f. per day. All produced gas is returned to the reservoir, and until recently, makeup gas was obtained from the dry-gas block to the south. All gas is scrubbed and metered to the various injection wells at pressures varying from 600 to 1,000 psi. Injection pressures do not appear to have increased materially.

Unitization made it possible to effect several changes in facilities. Tank batteries were consolidated, thereby reducing the number of tanks required. Lead lines were rearranged to allow blending to the highest crude gravities. All pumping units and facilities were electrified. These changes reduced repair costs, minimized the personnel necessary to handle the field work, and conserved gas needed for injection.

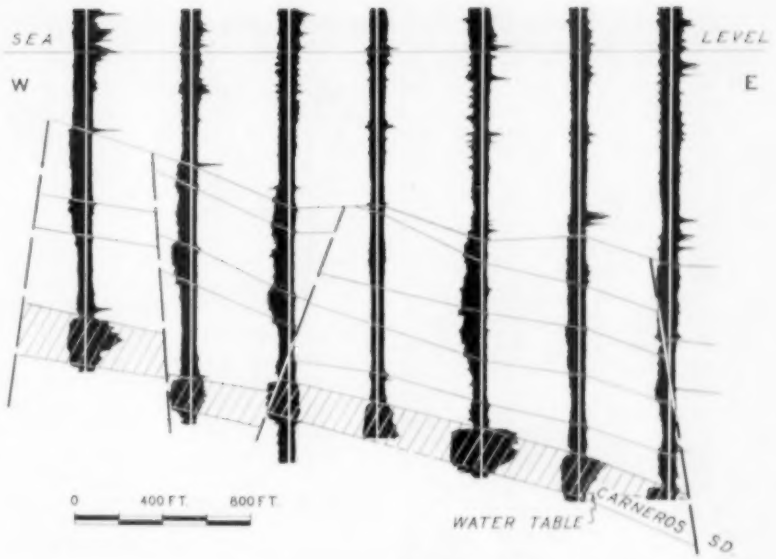


Fig. 3—East-west cross-section of Salt Creek Carneros Unit.

Reservoir characteristics . . . The pool was predominately a black-oil reservoir but did contain a gas block amounting to about 7 per cent of the total sand volume. The sand is medium grained, firmly friable, fairly clean, and fairly well sorted.

A limited number of cores were taken during development of the Carneros. Analyses of 39 samples show a range of porosity from 25 to 40 per cent. It is estimated that the weighted average porosity is approximately 30 per cent. Permeabilities show a variation from 10 to 3,940 md. with an approximate average of 1,000 md. There are no analyses of oil-base cores or capillary-pressure curves to determine water saturation. Calculations from electric logs indicated water saturations as low as 16 and as high as 40 per cent. It is estimated that the weighted average is 25 per cent.

Crude oil from the unit varies in gravity from 17° to 22° A.P.I. with an average of 18°. Using Standing's correlation charts, it is estimated that the original solution gas-oil ratio was

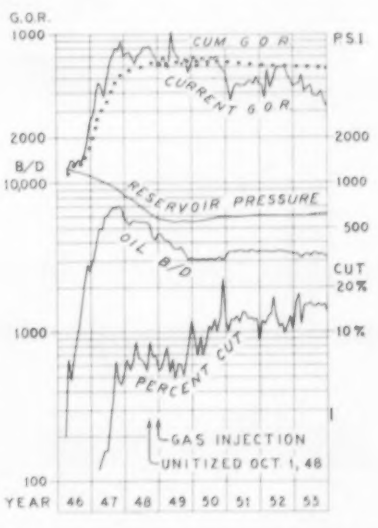


Fig. 4—Daily average production curves of reservoir performance.

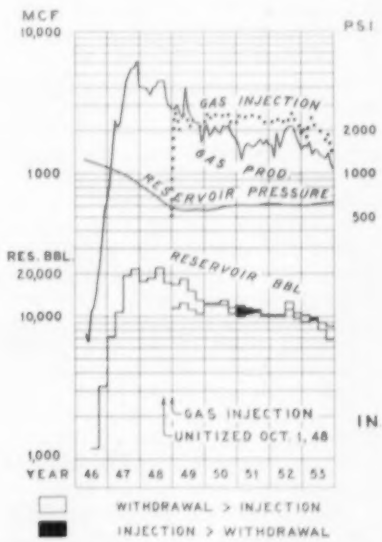


Fig. 5—Daily average injection withdrawal.

135 cu. ft. per bbl. at the original reservoir pressure of 1,230 psi. This compares favorably with field observations during the early life. There was no original gas cap in the oil-productive fault blocks. It is interesting to note that the dry-gas fault block contained no oil sand. It contains only dry gas with a specific gravity of 0.626 underlain by a water table approximately the same as in the oil blocks. The highest point in the gas block is more than 100 ft. lower than the highest point in the oil blocks where no gas cap existed.

The performance of this reservoir is probably the most interesting part of its history. Fig. 4 shows the daily average production. It will be seen that oil production reached a maximum of 1,200 bbl. per day in October 1947. Subsequently, production declined approximately 30 per cent per year. This decline is due, at least in part, to voluntary curtailment to an efficient rate.

During the first year under unit operation the practice of declining withdrawals was continued. During the last 4 years a fairly constant rate has been maintained ranging from 3,100 to 3,500 bbl. per day. This was possible since injection was approximately balanced against withdrawals and reservoir pressures were increasing slightly.

Static reservoir pressures have been taken at 3-month intervals throughout the life of the reservoir. These were taken at a datum of 1,750 ft. subsea. Pressures are measured in the annulus of pumping wells by means of offset tubing heads. The average reservoir pressure dropped from 1,230 to 580 psi. before gas injection was started. It leveled off very sharply at this time and has increased gradually to 625 psi. It is believed this leveling of pressure coincidental with gas injection is due to water influx rather than the immediate effect of the injection. Pressures increased during the latter part of 1953 even though injection rates were considerably below withdrawals. This can only be explained by water moving into the reservoir.

Gas-oil ratios have been reduced from 750 cu. ft. per bbl. to the current ratio of 330 cu. ft. per bbl. Cumulative gas-oil ratio has shown a slight decrease in the past 3 years. Water production has been minimized, the current rate being about 15 per cent of the gross production. The cumulative cut is only 9 per cent of the gross.

Withdrawals still greater . . . Fig. 5 shows the daily average fluid withdrawn compared with that injected expressed in reservoir barrels. It will be noted that during only two periods did injection exceed withdrawals. Currently

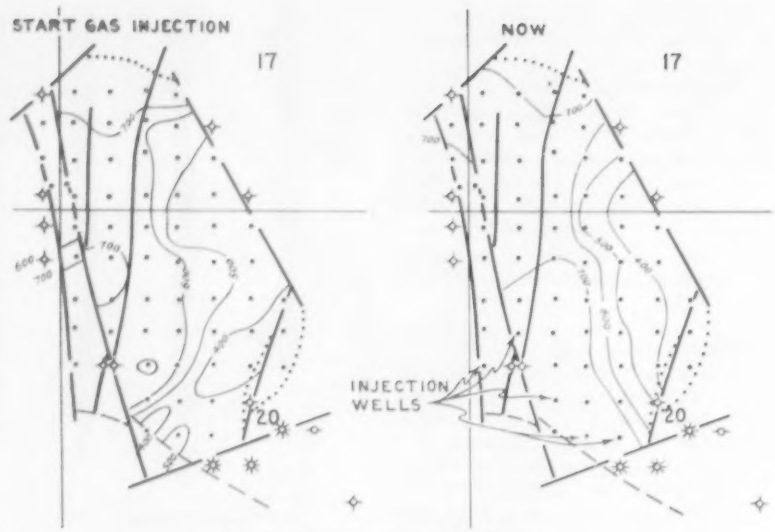


Fig. 6—Reservoir pressure distribution.

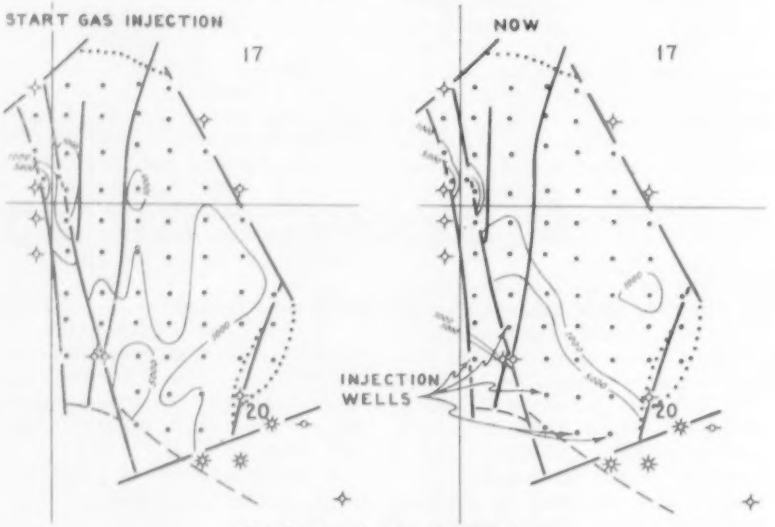


Fig. 7—Gas-oil ratio distribution.

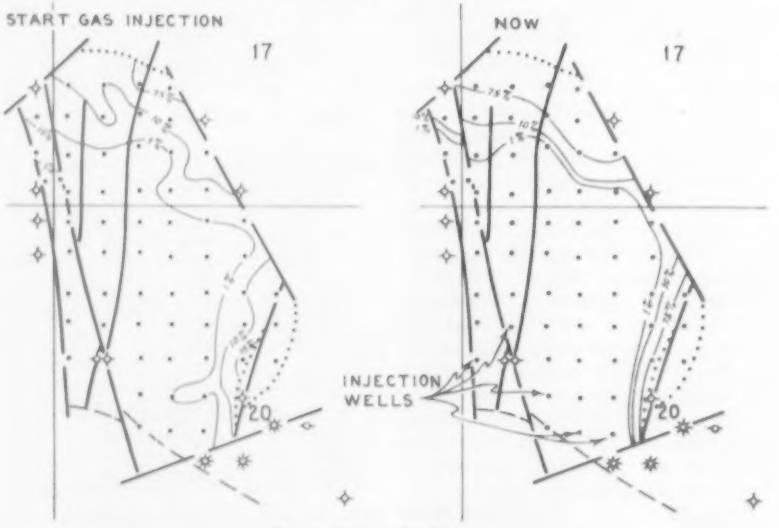


Fig. 8—Water distribution.

the unit is producing approximately 8,400 reservoir barrels per day and injecting 6,700 bbl. per day. In spite of this, reservoir pressures increased which is further evidence of a water drive. The reservoir-pressure curve has been repeated on this graph for convenience. Daily average gas injection and gas produced are also shown in Fig. 5. The difference in the two curves represents the amount of makeup gas taken from the dry-gas block.

The Carneros has produced 10,693,748 bbl. of oil and 6,808,171 M.c.f. of gas from the oil blocks to January 1, 1954. Prior to gas injection, the reservoir had produced a cumulative of 4,456,508 bbl. This is equivalent to 6,850 bbl. of oil per pound drop in reservoir pressure. During the period of gas injection, 6,237,240 bbl. has been produced at an injection gas-oil ratio of 675 cu. ft. per bbl. Production to date including oil, gas, and water represents approximately 34,575,000 reservoir barrels. Since unitization, 4,208,811 M.c.f. of gas has been injected or an equivalent to 19,393,000 reservoir barrels. Production, therefore, exceeds injection by 15,182,000 reservoir barrels.

To date the unit has produced 282 bbl. of oil per acre-foot. The dry-gas block has produced 828,211 M.c.f. of gas and is now depleted to an economic limit. This portion of the unit is estimated to have had originally 2,791 acre-ft. of gas sand. This represents 296,668 cu. ft. per acre-foot which is equivalent to approximately 1,370 reservoir barrels per acre-foot.

Three illustrations prepared to show the results of pressure maintenance compare conditions at the time injection started with the conditions now. The first is Fig. 6 showing the distribution of reservoir pressure. It will be noted that the area with pressures greater than 700 psi. has been greatly expanded.

The eastern side of the reservoir has not responded to injection as much as other parts of the reservoir. The trend of the 500 and 600-lb. isobars has not changed materially in the past few years. There is some evidence that recent alteration in the injection will improve conditions in this low-pressure area.

The gas-oil-ratio distribution is shown in Fig. 7. A very irregular gas-oil-ratio pattern existed at the inception of gas injection. Controlled production and injection have allowed gravity segregation to concentrate the secondary gas cap at a high structural position. Two exceptions to this exist in the northwest, probably where local faulting restricts segregation. Gravity drainage will probably contribute materially to the recovery efficiency of the reservoir.

Fig. 8 shows the distribution of water as a per cent of total fluid produced. When injection was started there was good evidence that water was fingering into the reservoir following an irregular pattern.

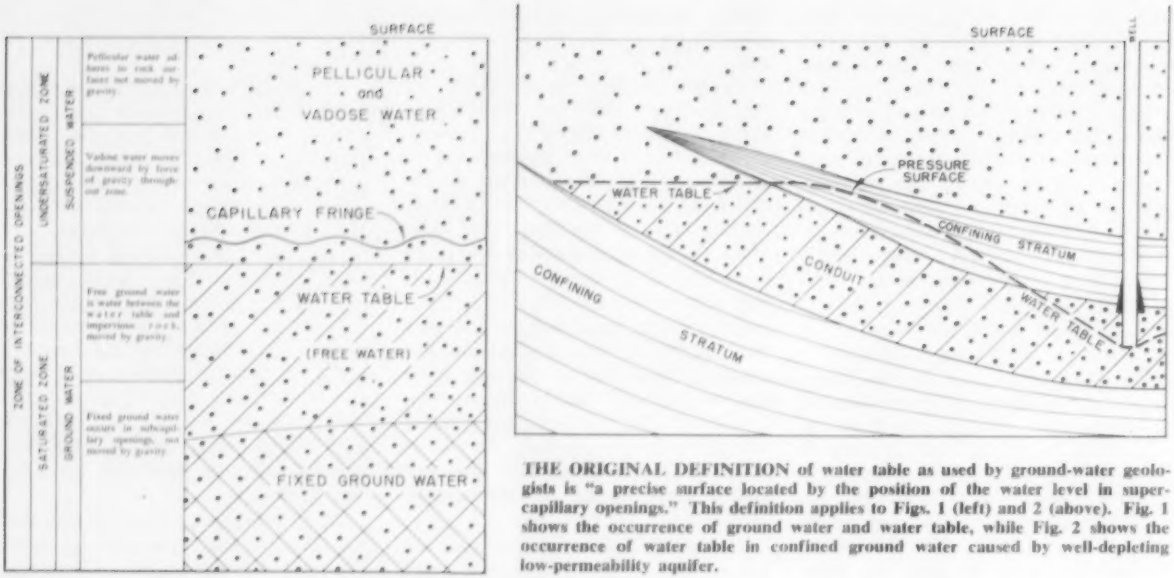
Water has continued to advance into the reservoir but on a uniform front. The zone of gradation from 75 per cent to 1 per cent has been reduced to a narrow band. If this control can be maintained in the future, a high recovery may be expected.

World Production of Crudes Containing 1 Per Cent or More Sulfur

*None in 1940

†Decrease due to loss in total production

(Chart courtesy the Kelloggram, M. W. Kellogg Co.)



THE ORIGINAL DEFINITION of water table as used by ground-water geologists is "a precise surface located by the position of the water level in supercapillary openings." This definition applies to Figs. 1 (left) and 2 (above). Fig. 1 shows the occurrence of ground water and water table, while Fig. 2 shows the occurrence of water table in confined ground water caused by well-depleting low-permeability aquifer.

How petroleum engineers have modified the method of

Defining Water Tables of Petroleum Reservoirs

by Carroll F. Knutson

At least three definitions of the term "water table" are used by geologists and engineers—one definition is used in ground water, and at least two definitions are used in petroleum geology.

Three of these definitions are summarized in this article, and the author suggests that the definition of water table as the surface formed by the top of the zone of essential water production, or the upper extent of the water as delimited by the water-oil and/or water-gas contact be used in the petroleum industry.

THE term "water table" was borrowed by petroleum geologists from the field of the geology of ground water. In an effort to make the term useful, the petroleum geologists have modified the concept in various ways. The concept of "water table" (see Fig. 1) is defined in ground-water literature as follows:*

> **Water table:** In pervious granular material the water table is the upper surface of the body of free water which completely fills all openings in material sufficiently pervious to permit percolation. In fractured impervious rock and in solution openings, it is the surface at the contact between the water body in the openings and the overlying ground air.
>
> The water table may be defined as a precise surface which is located by the position of the water level in supercapillary openings. This definition also applies to confined ground-water systems (Fig. 2).

The part of the definition which refers to openings of supercapillary size as a standard is included because of the utility to the ground-water geologist—the water-table level is usually measured in an opening of supercapillary size, i.e., a well bore.

In petroleum geology the term "water table" is generally defined in one of two ways:

A. The water table is the upper surface of the water phase, in a water-hydrocarbon system occupying the interstices of porous and permeable rock, that would occur in a supercapillary opening in the rock (Fig. 3).

B. The water table is the upper surface of the zone of essentially 100 per cent water saturation in the water-hydrocarbon system occupying the interstices of a porous and permeable rock. This surface may be ascertained by the manifestation of essentially continuous water saturation on electric logs, results of core analyses, production or drill-stem tests, or other data, and is the upper surface of the water as delimited by the water-oil and/or water-gas contact (Fig. 4).

The well bore does not represent the opening of supercapillary size used as part of definition A. Thus, we have no way of knowing where the water table of definition A will be found in rocks with interstices of capillary size. A review of some of the factors that are believed to occur in a petroleum reservoir will explain this statement.* Probably the two factors that are most important are capillary pressure and relative permeability.

*C. F. Tolman, Ground Water, pp. 224 and 565, McGraw-Hill Book Co., New York (1937).

*S. T. Yuster, "Some Theoretical Consideration of Tilted Water Tables," Jour. Petrol. Tech., Vol. V, No. 5 (May 1953), p. 149.

Author is reservoir engineer, Continental Oil Co., Los Angeles.

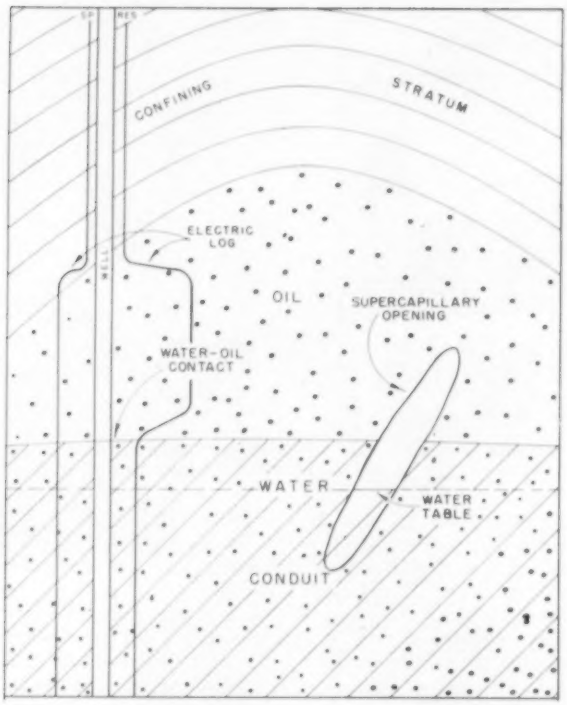


Fig. 3—Occurrence of water table as defined in Paragraph A.

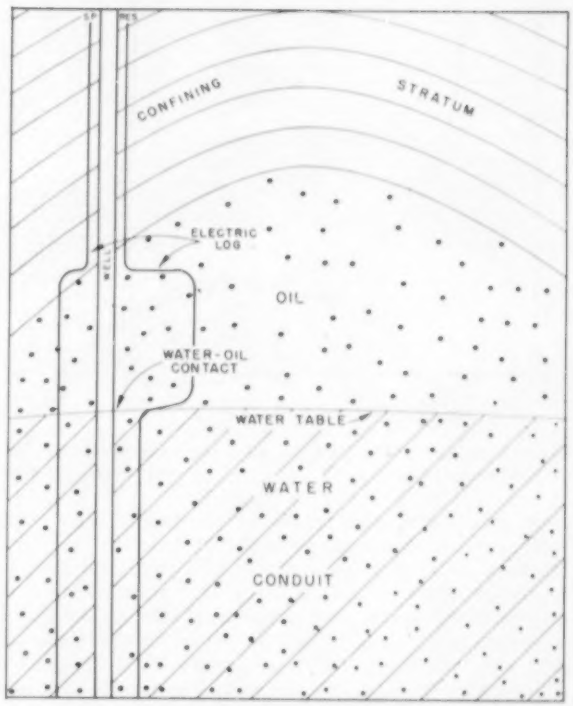


Fig. 4—Occurrence of water table as defined in Paragraph B.

The capillary pressure in a straight capillary may be defined by the expressions:

$$P_c = h\,g\,(d_w - d_{nw})$$

and

$$P_c = \frac{2\,s\cos\Theta}{r}$$

where:

P_c = capillary pressure
h = height of water surface in capillary above free external water surface
d_w = density of water
g = gravitational constant
d_{nw} = density of adjacent nonwater fluid
s = interfacial tension
Θ = contact angle measured through water phase

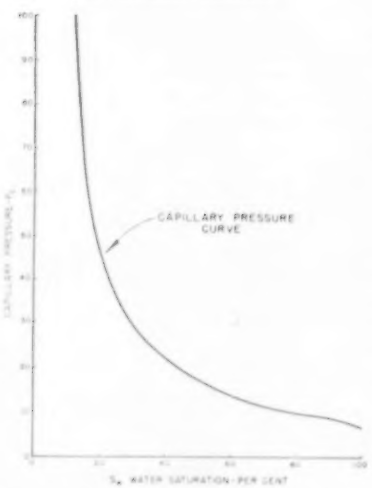


Fig. 5—Capillary-pressure curve for air-water-rock system.

A porous and permeable medium will have a characteristic drainage or imbibition capillary pressure curve. Since most fluid hydrocarbon accumulations occurred under conditions that would be represented by drainage curves, it may be well to consider one of these capillary-pressure curves (Fig. 5).

The effects of two oil-water systems may be illustrated by changing the ordinate of the curves to height in feet. Fig. 6A shows the height in feet of various water saturations in an air-water-rock system. Fig. 6B shows the height of various water saturations in the same rock but with a refined oil (of 0.8 density) water-rock system. Fig. 6C shows height of the various water saturations in the same rock but with an oil (0.9 density) water-rock system.

The height of the various water saturations is also dependent on the interfacial tension of the water-nonwater system and the contact angle of the water phase. Thus, the various hydrocarbons that occur in the reservoir would affect the determination of the distance from the water-hydrocarbon contact. As yet there is no reliable method for measuring the contact angle between the wetting phase and the rock in water-hydrocarbon-rock systems in a reservoir. Hence, the effects of the fluid-rock interactions are beyond the reach of current methods of evaluation.

A consideration of the factors in the capillary-pressure relations indicates that great volumes of difficult-to-obtain data are necessary to ascertain the "free" water surface in a supercapillary opening in oil reservoirs with capillary-size interstices.

Since much of the information about water tables is derived from production

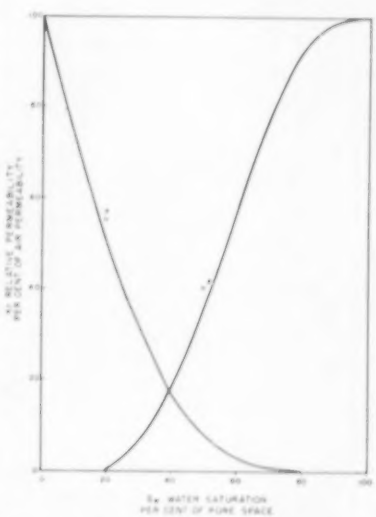


Fig. 6—Relative permeabilities of water and oil in a water-oil-rock system.

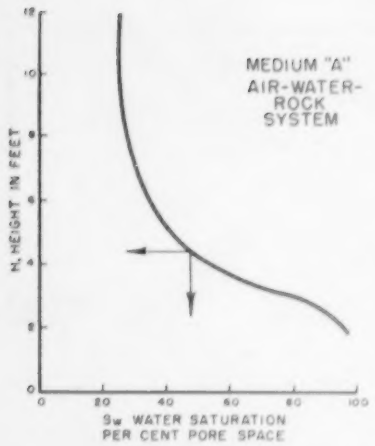


Fig. 6A—Height vs. water-saturation curve for air-water-rock system.

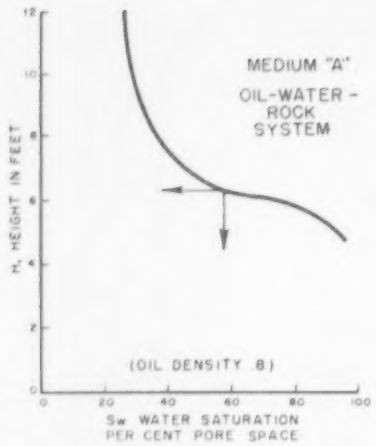


Fig. 6B—Height vs. water-saturation curve for oil (density 0.8)-water-rock system.

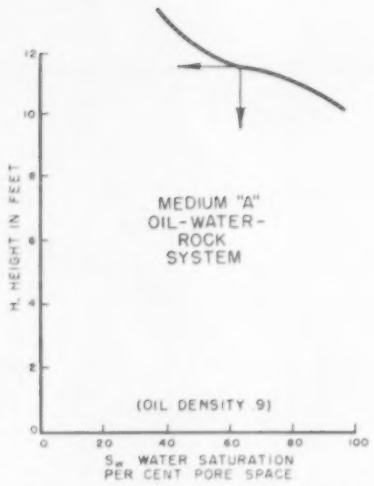


Fig. 6C—Height vs. water-saturation curve for oil (density 0.9)-water-rock system.

data, the relative permeability of the water and nonwater phases becomes important. Fig. 6 shows a generalized relative-permeability plot. Water is the only mobile phase at high percentages of water saturation, and consequently only water production will be obtained from zones with high water saturation.

A generalized example may be useful to illustrate the aforementioned concepts. In this example the reservoir fluid and pressure will be assumed to be constant, and only the reservoir rock conditions will change. Three wells will be drilled into the reservoir in regions of low, medium, and high permeability having respectively small, medium, and large interstices size. These general rock conditions may be illustrated by three capillary-pressure curves. In well A of Fig. 7, electric logs and drill-stem tests indicate the water-oil contact at 4,970 ft., in well B the contact is indicated at 4,980 ft., and in well C the contact is indicated at 4,995 ft. The water table, definition B, is curved up toward the edge or less-permeable areas of the reservoir, because of the decrease in mean interstices size in that area. The apparent downward curvature of the water table, definition A, is probably caused by the core-analyses data not being representative of the low-permeability area of the reservoir.

In this example the water table, definition B, may be ascertained by using electric logs, and/or core data, and/or drill-stem or production tests, while the water table, definition A, is impossible to evaluate throughout the productive zone in the field.

In reservoirs where vugs or large fractures occur, the water table would be adequately defined by either definition. However, in the capillary-size interstices in most petroleum reservoirs, the water table as defined by the water-oil and/or water-gas contacts, definition B, occur from a few to as much as a hundred feet above the free water level or water table, definition A. Does it appear consistent to call a difficult-to-find and theoretical level some place below the surface of 100 per cent water saturation in the reservoir, the "water table"? The writer does not believe so.

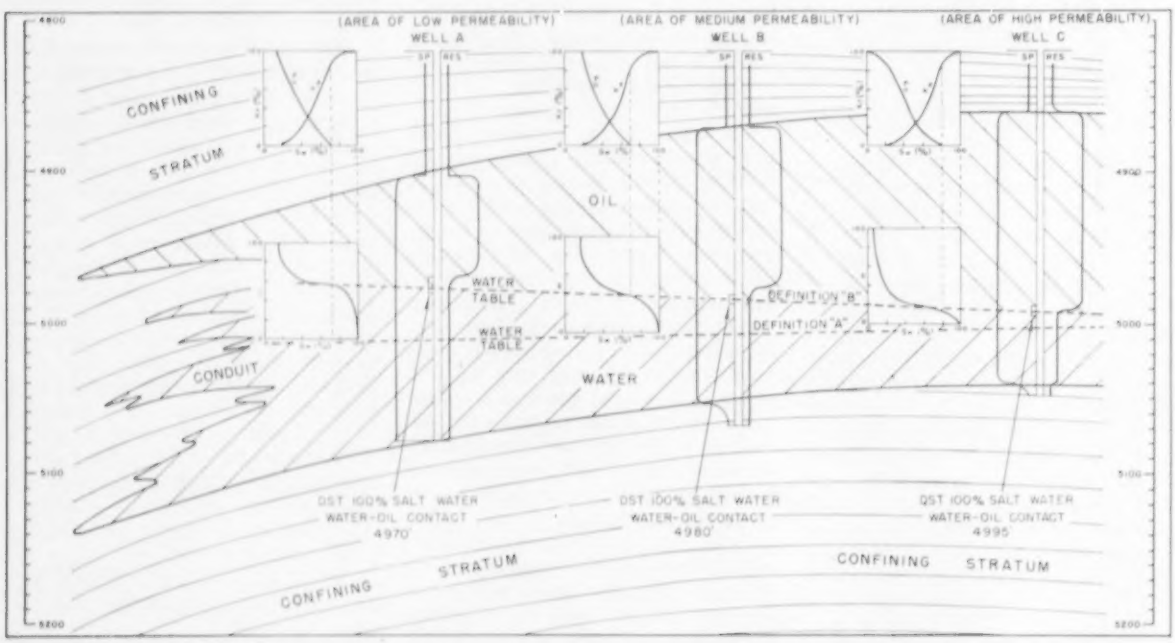


Fig. 7—Occurrence of water tables under definitions A and B in an example reservoir.

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Nondestructive Testing Detects Corrosion Damage

Though his prime responsibility is corrosion prevention, the corrosion engineer is also concerned wth nondamaging test methods. This survey records the latest techniques in this field.

by F. A. Prange and J. F. Headrick

INSPECTION work in the petroleum industry has two main ends—keeping equipment in a safe operating condition and maintaining process efficiency. The determination of vessel and pipe-wall thickness is of prime importance for safety reasons and the location of potential leak areas, in the form of cracks or pits, is necessary for maintenance of system continuity. Methods chosen for testing will vary with the prime objective in each case.

Most widely accepted tests methods in the industry are the use of visual inspection, mechanical calipers, and pit gages. Electrical instruments, operating on magnetic or ultrasonic principles, are being used more frequently for measurement of corrosion damage but are somewhat limited because of their inability to give quantitative results.

Present-day tools for inspection of tubular goods are still inadequate and much work remains to be done in this field.

Visual examination . . . The most valuable of the methods of nondestructive testing used in the oil industry is, without question, visual examination, though it can hardly serve as a quantitative measure. It allows the inspector to cover a tremendous area in a short period of time and much equipment in a refinery could not conceivably be checked in any other fashion.

A fair proportion of the pressure equipment in refineries is composed of towers containing bubble caps, chimneys, weirs, and downcomers. Simple visual examination will often show cracking or thinning and demonstrate the pattern of the corrosive attack.

Thickness measurement by use of mechanical calipers remains as an important method of testing in refineries. Exposed piping and furnace tubing are calipered and measurements recorded in extensive files. Pressure vessels are checked at nozzle locations only, though pipe is often cut for better coverage. Calipering is quite accurate and much desired for quantitative figures.

A form of caliper finds extensive use in the petroleum-producing industry for survey of corrosion attack on well tubing. There are two main types, mechanical and electrical, with the mechanical type being better adapted for recording detailed features of corrosion damage.

Corrosion in pressure vessels usually results in pit damage rather than in general surface damage and the pit gage is well adapted for making quantitative measurements of the results of this attack. Of course a good datum plane is necessary and sometimes a plug of stainless steel is placed in the vessel wall to furnish this base.

The drilling of test holes, while not entirely nondestructive, is also a means of determining wall thickness. The drilling and plugging of these holes is expensive and other methods are utilized where possible. A similar method is the use of telltale holes for determining the progress of corrosion. These holes are usually drilled to a depth corresponding to the minimum wall thickness allowed on the particular vessel. When corrosion thins the metal at the hole location a small leak occurs and gives the operator warning that repair or replacement is needed.

Electrical methods . . . The Audigage, an ultrasonic instrument, is used as a supplement and substitute for other ways of measuring wall thickness. Its advantages are speed, general coverage, and small amount of surface preparation necessary. Measurements can be made on almost any surface of a vessel instead of only at nozzles.

Disadvantages of the Audigage are that it takes a well-trained operator and gives unequivocal readings only if the surface is fairly smooth. Pits, laminations, and blisters are indicated only semiquantitatively.

Where the surface is too rough for the Audigage, or the wall too thin, or where high temperatures are involved, the Penetron comes into its own. This is a radiation-emanating instrument that measures the reflected or transmitted radiation. A noval use of the device is the measurement of thickness of catalytic cracking unit lift pipes while the unit is in operation. The instrument is an integrating device and does not accurately indicate the metal thickness at the base of pits. Over-all safety is indicated, however, since the strength of a vessel is more dependent on the average wall thickness than on the metal remaining in a pit.

Ultrasonic instruments are also widely used in testing for and locating fatigue cracks in heavy castings, shafts, etc. In this use, the ultrasonic device transmits a wave into the material and records the reflection from any discontinuity. By knowing the type of material, its shape, and the frequency of the sound wave, an experienced operator can readily tell the type and extent of any internal flaw.

Inspection of the interior of tubular goods presents a difficult problem and present-day tools and methods leave something to be desired. Damage will range from plug scores and mandrel marks in new tubes to fatigue cracks, pitting, and ringworm corrosion in old tubes. The Probolog, an eddy-current device having balanced coils in its detector circuit, is used to detect discontinuities in nonmagnetic tubing. It will indicate anomalies but cannot identify them nor measure extent of damage unless there is only one type of attack present.

Other defects that can also be serious are stress corrosion cracking, embrittlement cracking, and weld cracking. Magnetic-particle inspection is the most widely used method for detecting this form of damage. Another method of outlining cracks and weld defects is by fluorescent or colored penetrating dyes. These will locate very tight cracks which sometimes are not found by magnetic-particle inspection.

In-place testing of paints and other nonmagnetic protective coverings for over-all thickness is now readily accomplished by the use of a small self-powered magnetic instrument. The instrument's magnet poles are first placed flat against a steel surface and the meter zeroed. Then, when the instrument is placed against a painted surface, the paint thickness causes a difference in reluctance in the magnetic path and a consequent reduction in meter reading. By proper calibration the paint thickness can be read directly in thousandths of an inch.

Authors are with the engineering department, Phillips Petroleum Co., Bartlesville, Okla. Digest of paper delivered at annual meeting, National Association of Corrosion Engineers, Kansas City, 1954.

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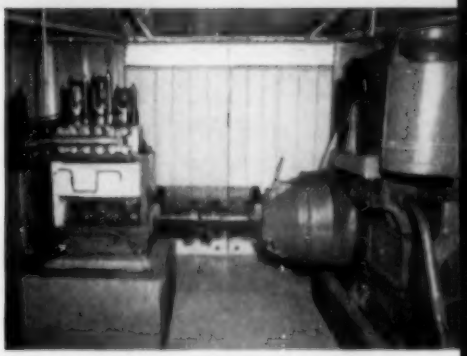

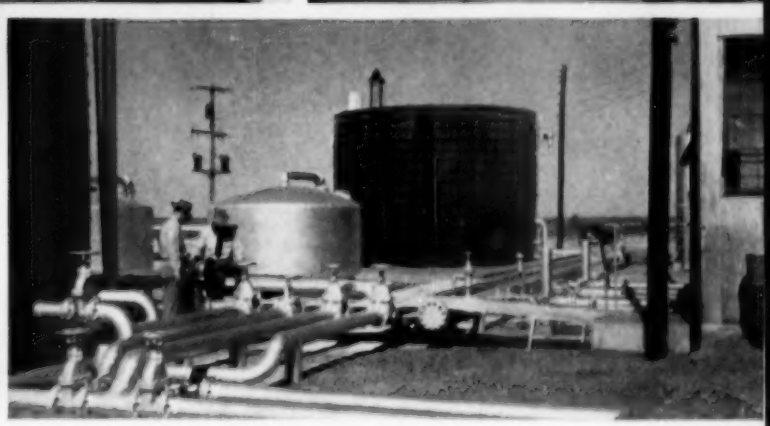

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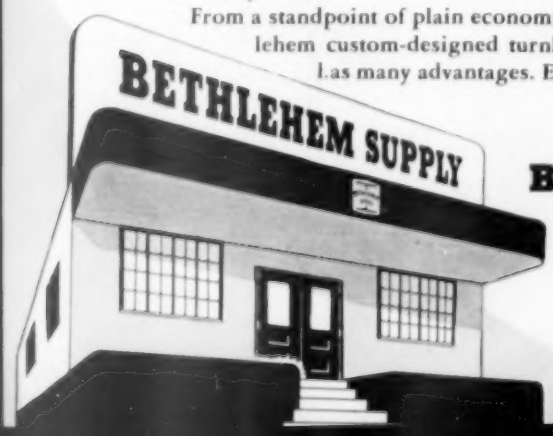

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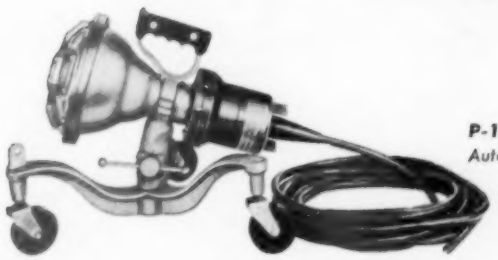

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How three companies handle

FRESH CATALYST ADDITION

1. Cities Service Refining Co., Lake Charles, La.

by William E. McFatter

ALTHOUGH great improvements have been made in the catalytic cracking process during recent years, there is still much controversy as to the best way to accomplish catalyst additions. There are many variables which must be considered before arriving at the most economic method of adding catalyst in any particular unit. In some cases certain controlling factors, even though not the most economic, will determine the method to be used. Various methods of additions which have been used on the three Kellogg-designed fluid catalytic cracking units at the Lake Charles, La., refinery of Cities Service Refining Corp. are discussed in this article.

Problems in Dilute-Phase Addition

In the original design of the Lake Charles units, provisions were made to add catalyst in the same manner on all three fluid units. These additions were made batchwise from the fresh catalyst storage hopper into the dilute phase of the regenerator. The hoppers were pressured by air to 15 psi. and the rate of catalyst flow was regulated by a manual valve in the standpipe beneath the storage hopper.

The catalyst dropped into a 6-in. transfer line and was carried by 15 psi. combustion air into the dilute phase of the regenerator. Air rates were manually regulated at 3,500 to 4,000 lbs. per hour and additions were made at the rate of about 10 tons per hour. The addition rates were measured by using a differential-pressure meter which measured the weight of catalyst in the regenerator vessel.

Afterburning . . . Due to the excess oxygen being introduced into the dilute phase, afterburning always occurred when charging catalyst in this manner and the carrying air could not be utilized to burn carbon in the bed. It was also noted that the stack losses increased during the time necessary for charging the catalyst. Catalyst particles in the dilute phase do not have the cohering tendencies that are present in the dense phase and possibly for this reason the stack losses increased during this period.

Batch Addition Into Dense Phase

After this method of additions did not prove satisfactory, facilities were installed on all three units to add the catalyst into the dense phase in the regenerator vessel. Additions were made and measured in the same manner as previously used, except that the catalyst entered through a 6-in. charge line into the dense phase in the regenerator and 45-psi. air was used as carrying air. This method proved more satisfactory due to elimination of the afterburning and reduction of the stack losses.

Lowered bed temperature . . . However, on heat-balance units it was found that the rapid addition of cold catalyst in batches into the regenerator lowered the bed temperature and caused increased catalyst-circulation rates. As a result, feed rates had to be reduced. Calculations show that when charging cold catalyst in this manner at the rate of 10 tons per hour, the reduction in feed rate necessary to hold a constant carbon production is 1,200 bbl. per day for the duration of the charging time. Actual operations on the unit have substantiated this figure.

Addition to Spent-Catalyst Transfer Line

Next a new method was tried on only one of the units. A nozzle was installed on the spent-catalyst transfer line just downstream of the spent-catalyst standpipe so that the catalyst could be charged into this line using 15-lb. combustion air as the carrying medium. Additions were still made batchwise from the catalyst storage hopper as in the two previous systems.

Not satisfactory . . . This method did not prove satisfactory because the addition of the cold catalyst affected the temperature differential in the spent-catalyst transfer line. During normal operations a constant carbon production

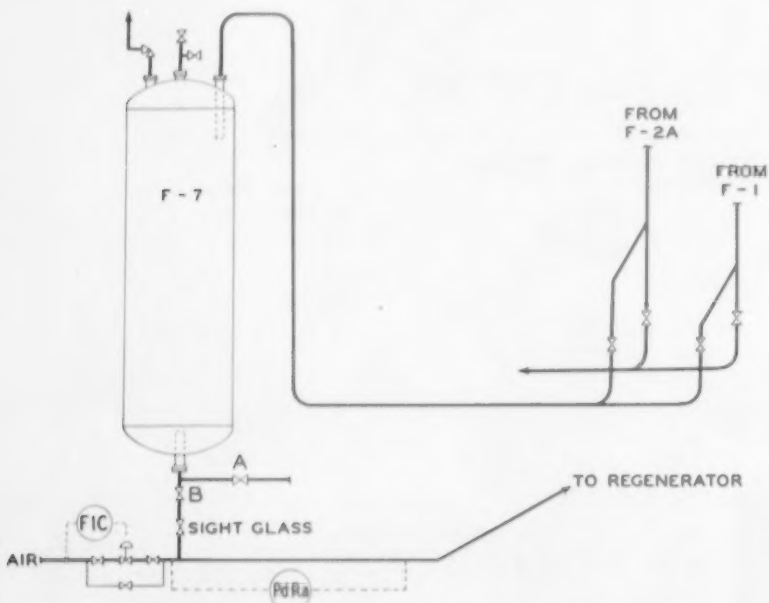

Fig. 1—This is how Cities Service Refining Co. makes continuous addition of catalyst into the dense phase of the regenerator. Fresh catalyst from F-1 or F-2A storage hopper is transferred with compressed air to drum F-7.

is maintained, and with all other variables being constant, any increase or decrease in carbon production is quickly indicated by an increase or decrease in the temperature differential between two points on the spent-catalyst transfer line. By using this spread meter and controlling the carbon production, most afterburning or high levels of carbon on catalyst can be eliminated before they actually start. It was found that this method of control was lost during the catalyst additions when it is most needed, and as a result, operations and throughput suffered. For this reason the method was abandoned.

Adding Catalyst with Feed

Mixing of the fresh catalyst in part of the fresh feed and charging into one of the reactor feed lines was then tried on one of the units. About 1,000 bbl. per day of fresh feed was continuously bypassed from the fresh-feed circuit upstream of the feed preheat exchangers into a small 4-ft. diameter by 10-ft.-high mixing drum. Ten tons per day of catalyst were added by dropping from the hopper through a ½-in. slide valve into a 1-in. transfer line where it was carried by air at 25 to 30 ft. per second into the mixing drum. The slide valve was operated by differential pressure between two points on the 1-in. transfer line.

The cold catalyst and oil slurry were pumped into one of the reactor feed lines. A small portion of the slurry was recirculated to the top of the mixing drum to insure good mixing of the oil and catalyst. The addition rate was measured by metering the oil flow before mixing with the catalyst and by analyses of the concentration of the slurry entering the feed line.

Standpipe plugged . . . Due to the small opening in the slide valve, it was very difficult to maintain a constant catalyst flow at the low rates necessary, and a great deal of plugging of the standpipe just above the valve was experienced. It was also noted that stack losses increased while adding catalyst.

In cases where the oil is soaked in catalyst and the cold mixture added into the reactor, the heat of cracking is supplied externally to the cold-catalyst particle and it is believed that this tends to carbonize the oil on the catalyst. Therefore, the carbon level on these catalyst particles is higher than normal and gives increased stack losses when trying to add catalyst slurried in the oil as in the above case.

Continuous Addition Into Dense Phase

A method of continuous charging into the dense phase of the regenerator was then designed and built using as much existing equipment as possible. This system has now been in use for about 7 months and is shown in Fig. 1.

Fresh catalyst from the F-1 or F-2A storage hopper is charged batchwise by transferring with compressed air into a 10-ft.-diameter by 30-ft.-high drum. Filling of this drum which has a capacity of 30 tons requires about 2 hours. The drum is then pressured to 15 psi. using compressed air and the additions are ready to start.

How catalyst is added continuously . . . Carrying air (15-psi. combustion air) is first started through the 1½-in. transfer line at the rate of 750-800 cu. ft. per hour. A small amount of aeration air is then put into the standpipe at the point A. The manual valve at B is then opened and catalyst flow starts. This valve is then set for the desired addition rate which is measured by a differential meter, which measures the differential pressure across two points in the transfer line. At the present time, catalyst is being added at the rate of 10 tons per day; therefore, the additions have to be stopped for 2 hours each third day to recharge the F-7 drum.

Satisfactory method . . . This method of additions has proved very satisfactory and has eliminated the reductions in throughput which are always necessary on heat-balance units when charging cold fresh catalyst rapidly in large batches directly into the dense phase of the regenerator. It has also been found that stack losses are lower when charging continuously as compared to batchwise additions, and that the catalyst fines are present in the unit to furnish lubrication for the bed for a much longer period of time.

The service factor on this system has been very good. There is some plugging of the standpipe, mostly due to water in the air; however these plugs are usually easily removed by blasting with high-pressure air. Though the system has not been out of service for inspection, it is believed that erosion of the lines, valves, etc., will not be severe because of the low velocities which are being used.

We feel that this method of additions has been the most successful tried to date. Calculations show that the average age of the equilibrium catalyst is increased when going from batchwise additions to continuous additions for any constant addition rate and inventory. However, it is believed that this is offset by the increased performance of the unit due to steady operations and feed rates. When adding the catalyst continuously, the carrying-air rates used are at a much lower and constant rate. With lined-out operations most of this air is also used to burn carbon, whereas in batchwise addition the air rates are much higher for the short time of the additions and a good amount of the air is not properly utilized and is wasted.

2. Eastern States Petroleum Co., Houston

by F. Lawrence Resen
Gulf Coast District Editor

PRESENT addition of makeup catalyst on Eastern States Petroleum Co., Inc.'s fluid unit at Houston refinery is made on a 2 to 3-times per shift schedule on a 24-hour basis.

Catalyst is dropped out of the storage hopper and picked up with an air stream which carries it to an injection point in the catalyst-carrying line from the reactor to the regenerator.

Makeup is scheduled according to the unit catalyst activity and regenerator level, with fresh catalyst used for the former case and regenerated spent catalyst used to maintain unit level. Unit inventory is maintained at a total of about 175 tons with 4.0 tons being the average makeup, divided about evently between fresh and regenerated catalyst.

Unit background . . . The fluid unit is of U.O.P. design (Fig. 2) and is a wartime model completed in 1943 with a design rate of 4,500 bbl. per day charge to produce aviation-base stock at high conversion. The unit has since been modified to increase its capacity to a current 16,500 bbl. of fresh feed. Charge is virgin gas-oil, with microspheroidal synthetic catalyst being used.

Under the original operating conditions, fine particles carried over in the flue gas from the regenerator were recovered in a Cottrell electrostatic precipitator. A continuous return of fines was picked up by an air stream and transported from the precipitator standpipe to the bottom of the regenerator. In 1950, primary Buell cyclones were installed in both the reactor and regenerator to supplement the multicone section in each.

Modification necessary to increase unit capacity required increasing regenerator pressure to the point where

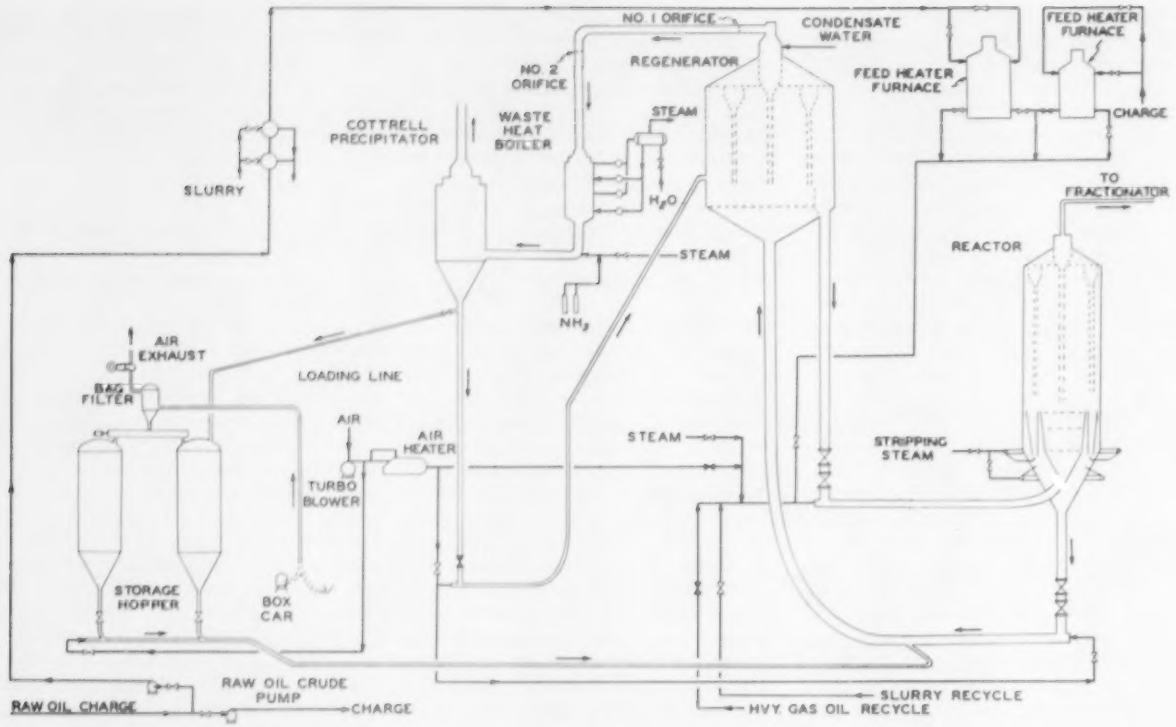

Fig. 2—Eastern States Petroleum Co. fluid cat cracker. Catalyst is picked up with an air stream from storage and carried to an injection joint.

it was no longer possible to maintain the necessary pressure balance, and thus this decreased the differential between the Cottrell standpipe and regenerator. Consequently, the Cottrell fines are being dropped by gravity flow into the spent-catalyst hopper and from there loaded into a catalyst charge line to be carried by air to the regenerator riser.

Possibilities . . . At the present time, this system of adding or returning fines is a satisfactory compromise on the basis of over-all plant economics. However, it is not necessarily felt to be the best and a study has been made which indicates it would be better to add fresh catalyst by mixing with oil to form a slurry and charge directly to the reactor. However, it would take a significant increase in preheat capacity to maintain the proper heat balance in the unit in light of the amount of cold oil which would be introduced with this method.

Assuming this increased preheat capacity will be economically justified, the benefits to be gained by such a system are listed as follows:

1. The fines and lighter particles will become coated with carbon, making them heavier and more apt to circulate longer in the unit.

2. The fresh catalyst fines will have at least one pass through the reactor before entering the regenerator, from which they may be rejected during the regeneration phase.

3. It would permit continuous addition of catalyst to the circulating system as opposed to the slugs being injected now.

4. Controlled addition of makeup catalyst would be possible. Pressure loading of the catalyst is now being made and the catalyst hopper level is somewhat indeterminate.

Operations . . . The Eastern States unit has been operating with makeup catalyst being charged as noted and has been averaging 1 year per run. In a typical operating day, feed has averaged 16,000 bbl. with gasoline output averaging 5,500 bbl., naphtha 500, light gas-oil 2,800, and heavy gas-oil 1,900.

The catalyst-to-oil ratio has been approximately 10, the coke laydown 17.5 lb. per bbl., and the carbon on spent catalyst 0.71 weight per cent. The carbon on the regenerated catalyst has been 0.34 weight per cent. Equilibrium of the catalyst has been maintained at U.O.P. weight activity of 27. As noted in the opening statements, about half of the makeup catalyst of 4.0 tons daily is used to maintain this activity, with the other half being used to maintain regenerator level.

Typical particle-size distribution may be seen from the average of two catalyst analyses taken a week apart. The average particle size was 58-μ. Breakdown was as follows: 0 to 20-μ, 1.2 per cent; 20 to 40-μ, 12.3 per cent; 40 to 80-μ, 77.8 per cent; and 80-μ plus, 8.7 per cent. Other operating data may be seen in Table 1.

TABLE 1—TYPICAL OPERATING DATA

Charge:	
Virgin gas-oil, bbl.	13,984
Slurry recycle, bbl.	285
Heavy recycle, bbl.	1,613
Total	15,882
Yields:	
Cat gasoline, bbl.	5,409
Cat naphtha, bbl.	507
Light gas-oil, bbl.	2,768
Heavy gas-oil, bbl.	1,841
Decanted oil, bbl.	1,058
Poly feed, bbl.	2,885
Total	14,468
Reactor:	
Temperature, °F.	915
Pressure, psig.	21.7
Cat. holdup, tons	65.2
Carbon on spent cat., wt. per cent	0.71
Conversion, vol. per cent	58.4
H_2 in coke, wt. per cent	13.5
Wt. hourly space velocity	1.59
Coke burned, tons	122.5
Coke burned, wt. per cent on feed	5.61
Catalyst-oil ratio	10.0
Regenerator:	
Temperature, °F.	1,080
Pressure, psig.	13.8
Cat. holdup, tons	63.0
Air rate, s.c.f.m.	31,980
Carbon on regen. cat. wt. per cent	0.34
Days on stream	528
Coke laydown, lb. per bbl.	17.5

Oil harvest

IT'S AN OIL HARVEST these days. Without oil many more men and horses would be needed to reap the world's rich harvests.

Anglo-Iranian is finding—and refining—more and more oil each year. The new Aden refinery has gone on stream, another is building at Kwinana, in Western Australia and new plant speeds production at existing refineries. Their total capacity will rise before long to 600,000 barrels a day.

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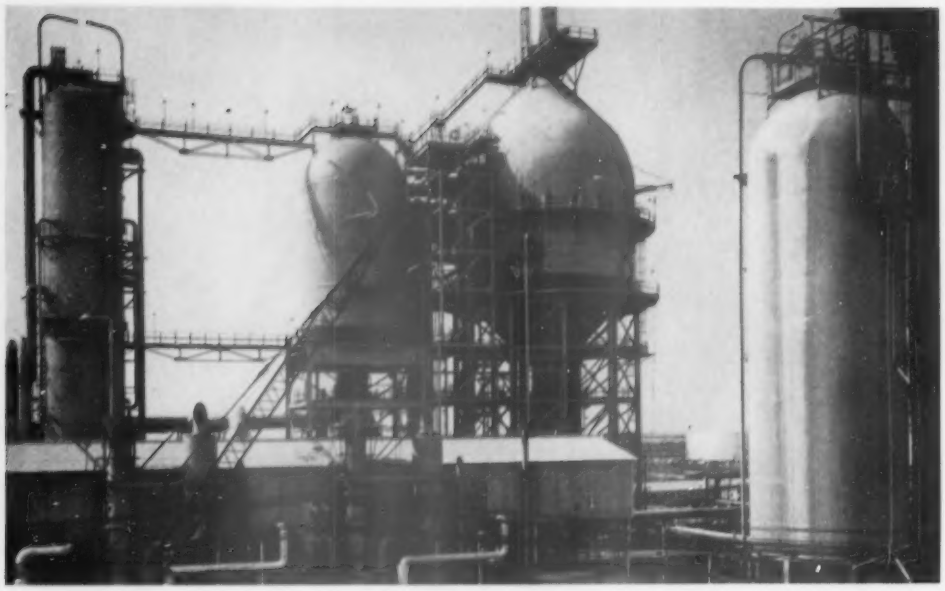


Gulf Oil Corp.'s 63,000-bbl. per day fluid cat unit at Port Arthur. Fractionator, reactor, regenerator, and catalyst storage drum are shown.

3. Gulf Oil Corp., Port Arthur

by F. Lawrence Resen
Gulf Coast District Editor

UNDER present operating conditions, Gulf Oil Corp. adds makeup catalyst daily during a 4 to 6-hour period to its 63,000-bbl. per day fluid unit at Port Arthur refinery.

Addition is made to the spent-catalyst line just below the slide valve on the reactor standpipe. Catalyst-addition rate is regulated to maintain system activity and is in excess of fines loss due to attrition. Catalyst is discarded from the regenerator cone as required to maintain unit inventory.

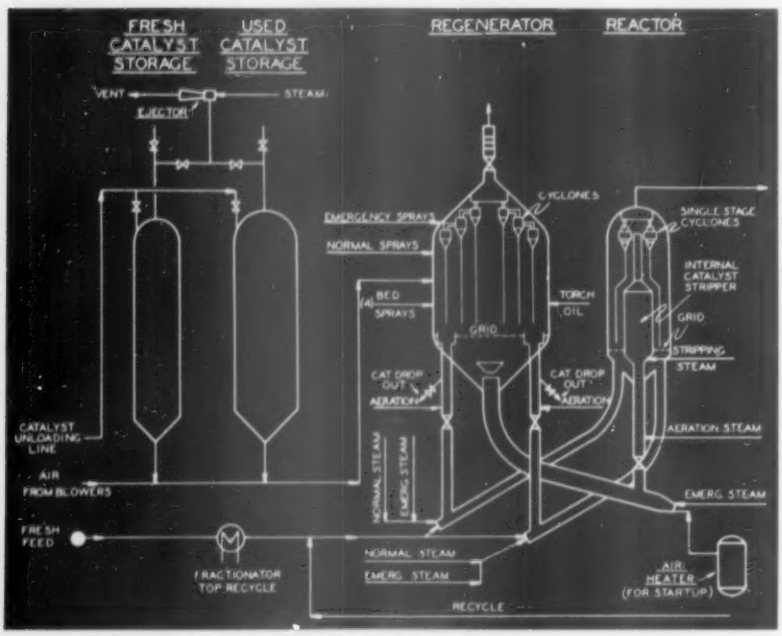


Fig. 3—Catalyst addition for Gulf Oil Corp.'s fluid cat unit is made to the spent-catalyst line just below the slide valve on the reactor standpipe.

Unit background . . . The fluid catalytic cracking unit (Fig. 3) is of M. W. Kellogg Co. design, having originally gone onstream in the fall of 1951. Feed to the unit amounts to 48,000 bbl. per day fresh gas-oil, and 15,000 bbl. of recycle stock.

Catalyst used in Filtrol SR-Type 81, with catalyst activity maintained at 20.5 on the basis of the 2-hour Kellogg test. Catalyst-oil ratio is 13 with the space velocity equal to 3.0 and coke-burning capacity of 50,000 lb. per hour. Particle distribution on system catalyst is 1 per cent of 10 to 20-μ particles; 36 per cent 20 to 40-μ 55 per cent 40 to 80μ; and 8 per cent being 80μ-plus.

Cat makeup . . . Initially, the makeup catalyst was charged directly to the regenerator bed. With the makeup charged into the spent-catalyst stream, the direct loss of fines to the stack has been decreased. By this means of addition, the fines have an opportunity to circulate before being ejected from the unit.

The regenerator is euqipped with three-stage cyclones and does not have an electrostatic precipitator.

The unit is equipped with a catalyst classifier. If the system catalyst has become coarse, the classifier can be operated and catalyst which is considerably coarser than the system catalyst can be discarded.

Fundamentals of Gas Lift—4

Horsepower Is Best Yardstick for Design

by Prof. C. V. Kirkpatrick

IN comparing two or more possible designs for a gas-lift installation on a well, there must be some criterion for determining the most efficient one. The theoretical adiabatic horsepower required to compress the lift gas from the tubing pressure to the injection pressure is merely relative, but it is a very good yardstick for comparative analysis.

It is generally conceded that the flow mechanism within the tubing is probably more nearly isothermal than adiabatic, but there is little difference in the theoretical values given by each method.

It is to be emphasized that neither the adiabatic nor the isothermal value is the actual horsepower value. Gas deviation has not been accounted for, in addition to the fact that neither process represents the actual condition within the flow string. The figures represent relative values to be compared with other injection pressures and injection gas-oil ratios. It is believed that the adiabatic horsepower is a more nearly correct yardstick, because a compressor approaches adiabatic conditions more nearly than the tubing well stream approaches isothermal conditions.

Author is chairman, department of petroleum engineering, University of Houston.

The theoretical adiabatic horsepower required to compress the gas for the example in foregoing installment between the tubing pressure of 100 psia. and the injection pressure of 575 psia. may be calculated as follows:

Adiabatic horsepower (for ideal gas):

$$Hp. = \frac{Q_G}{33{,}000} \frac{144\ P_2V_2}{(1 - k)} \times [(P_2/P_1)^{(k-1)/k} - 1]$$

where:

- Hp. = horsepower
- Q_G = rate of gas injection in cu. ft. per minute
- P_2 = injection pressure, psi.
- V_2 = volume of injected gas at injection pressure P_2 and injection temperature T_2
- k = ratio of specific heats for natural gas (may be taken as 1.3)
- P_1 = tubing pressure, psia.

Using the values in the previous installment, V_2 is injection G.O.R. at standard conditions (14.65 psia. and 60° F.) corrected to injection conditions (575 psia. and 130° F.).

Hence:

$$V_2 = (3{,}810) \frac{14.65}{575} \frac{590}{520}$$

$$= 108 \text{ cu. ft.}$$

Therefore:

$$Hp. = \frac{575\ 144\ 108\ 40}{1{,}440\ 33{,}000\ (1 - 1.3)} \times [(575/100)^{(1.3-1)/1.3} - 1]$$

$$= 12.50 \text{ Hp.}$$

It will be shown in a later detailed analysis that this is not the most efficient operating condition from the standpoint of horsepower requirement.

Isothermal . . . The formula for isothermal horsepower is:

$$Hp. = 144\ P_2V_2\ (\log_e P_2/P_1) \times \frac{\text{Ft.}^3/\text{Day}}{1{,}440} \frac{1}{33{,}000}$$

where the terms are as defined before.

Hence for the above condition, the isothermal horsepower would be:

$$= \frac{144\ 575\ 108\ 40 \log_e (575/100)}{1{,}440\ 33{,}000}$$

$$= 13.19 \text{ Hp.}$$

A Detailed Analysis

Inasmuch as there is no hard and fast rule that will immediately yield the best design of a continuous flow gas-lift installation, data must be computed for several complete designs, each having a different set of producing conditions.

This involves:

1. Assuming several different injection gas-oil ratios for the same tubing-head pressure and the same oil-producing rate.

2. Compute the same data for different tubing-head pressures.

Now data from 1 and 2 will allow a plot of:

A. Injection gas-oil ratio for different well-head pressures.

B. Injection pressure vs. theoretical horsepower for different well-head pressures.

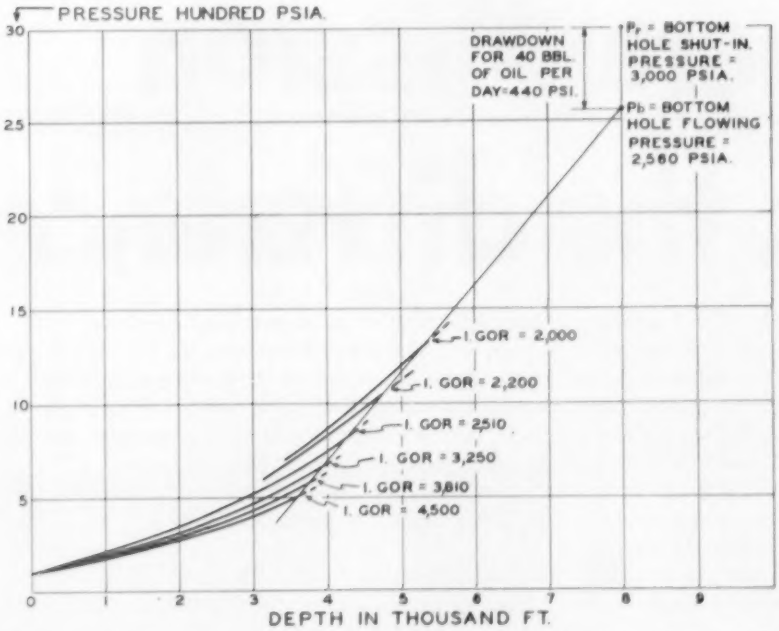
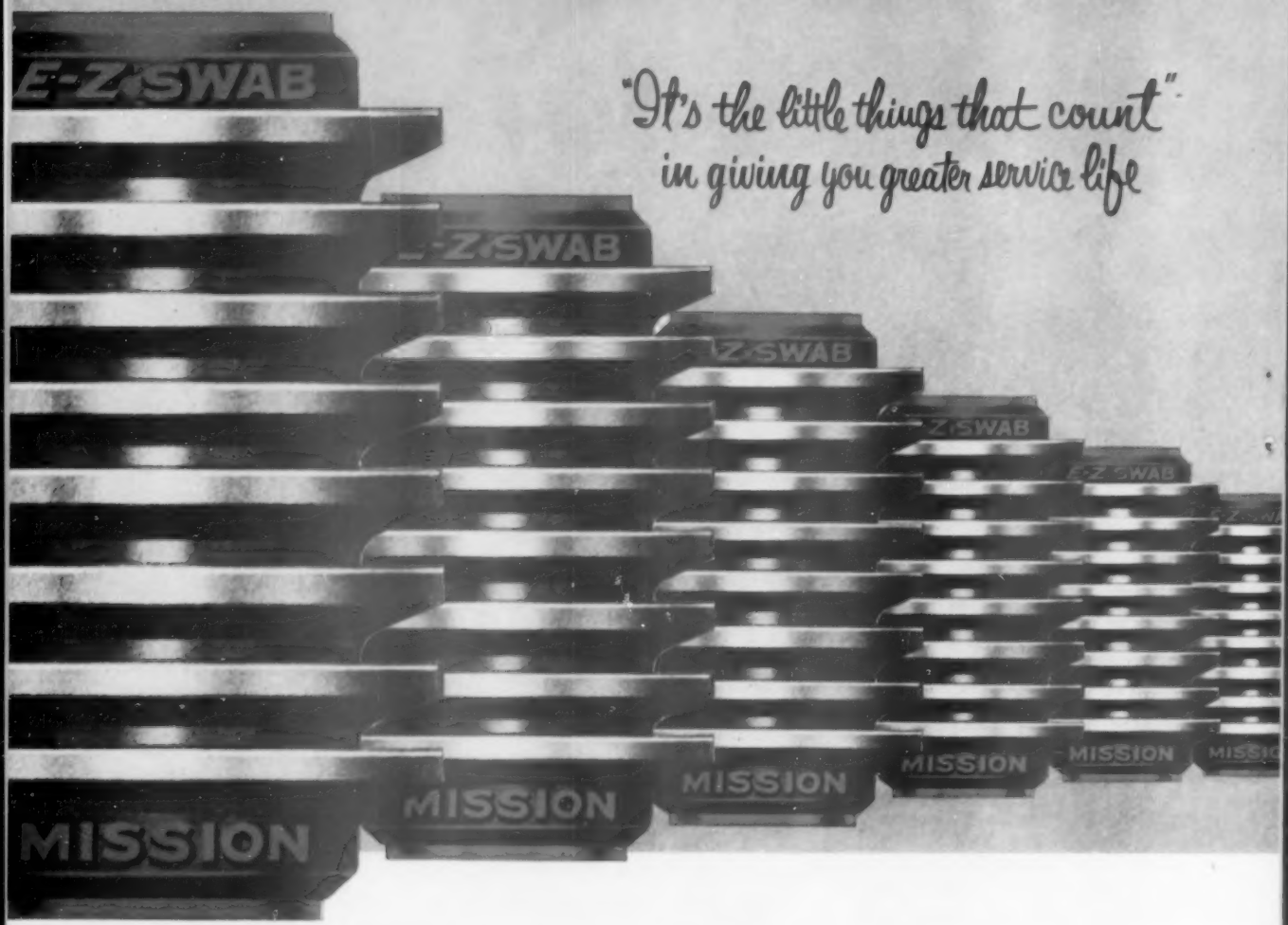


Fig. 1—Various values of injection gas-oil ratio are here plotted for the conditions of the design example.



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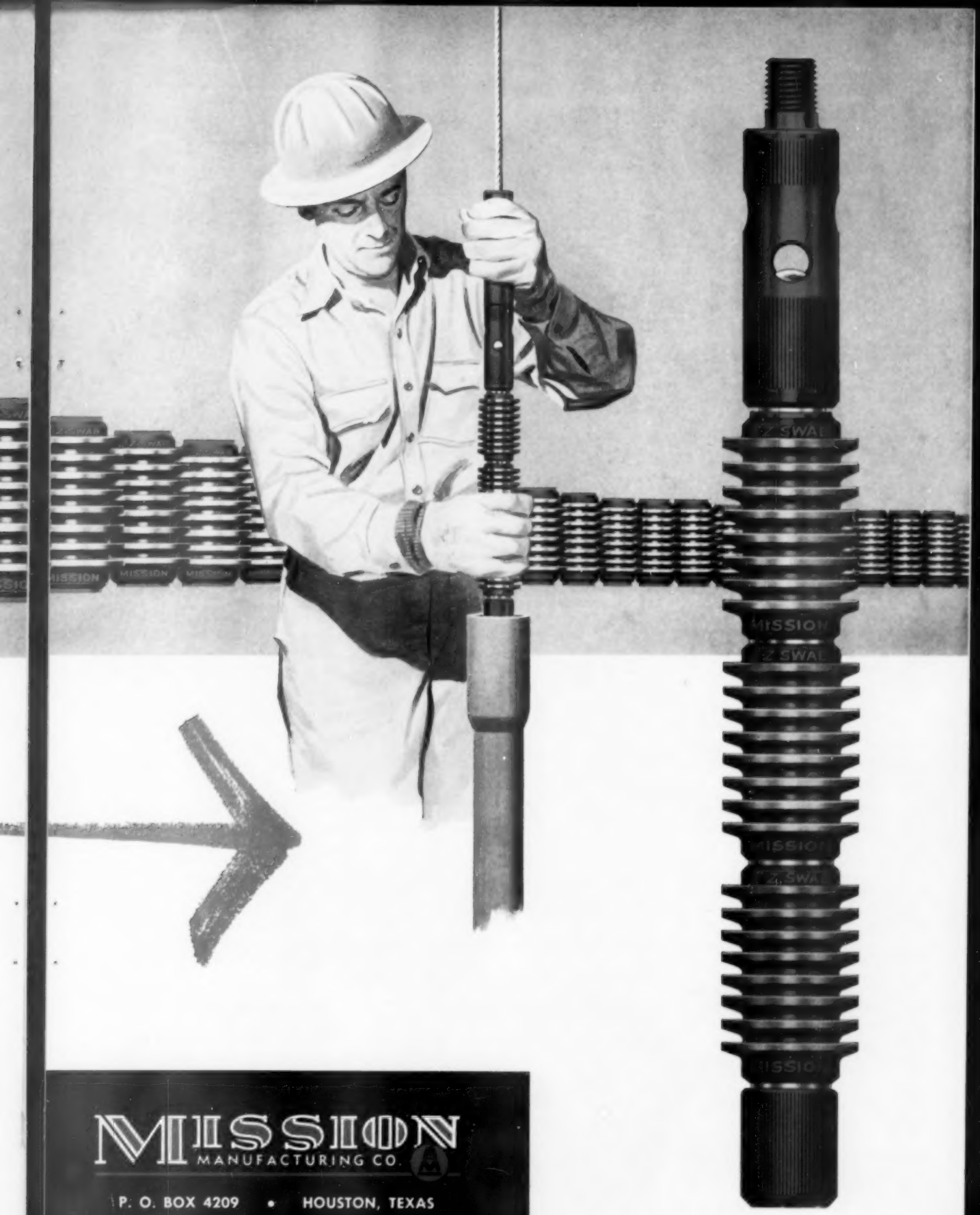

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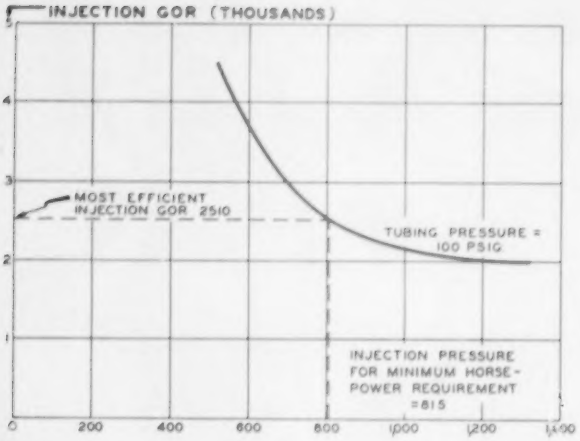

Fig. 2—This comparison of injection gas-oil ratio injection pressure is made from the data in Fig. 1.

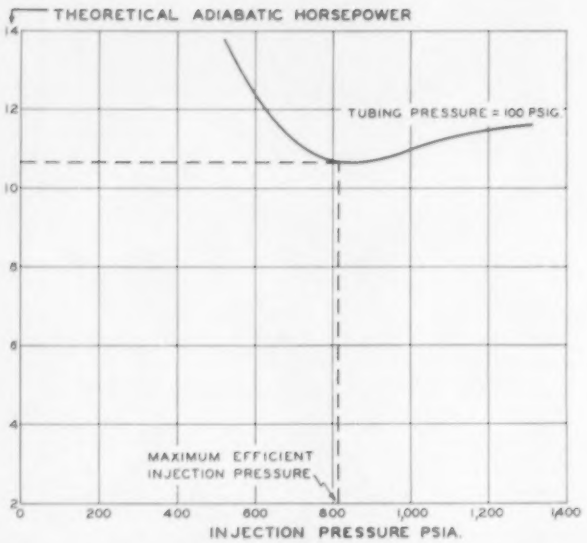

Fig. 3—This diagram is plotted from several values of injection pressures and gas-oil ratios to arrive at the most efficient injection pressure.

Hence selection of the injection pressure that yields the minimum horsepower requirement will represent the optimum design conditions. From this optimum injection pressure, the injection gas-oil ratio can be determined from the graph of injection pressure vs. injection gas-oil ratio. A pressure traverse may now be plotted for the optimum condition and the flowing gradient established.

Fig. 1 shows the results of different injection gas-oil ratios for the same condition given in the problem example of Installment 3. Data from this graph have been utilized to plot Fig. 2, injection pressure vs. injection gas-oil ratio. Fig. 3 has been plotted from data obtained by the computation of theoretical adiabatic horsepower requirement for the various injection pressures and injection gas-oil ratios.

Optimum conditions . . . From Fig. 3, it can be observed that the optimum operating conditions would be represented by the point of minimum horsepower requirement for the given producing rate. In this instance, an injection pressure of 815 psia. and an injection gas-oil ratio of 2,510 cu. ft. per bbl. (Fig. 2), represent maximum efficiency for the 100-psia. tubing back pressure.

It is recognized that the high-pressure requirement for maximum efficiency operations is definitely a limiting factor in any practical well installation. Fig. 3 does, however, emphasize that utilization of maximum available injection pressure is highly desirable, provided such pressure does not exceed the maximum efficient point.

It is most important to recognize that, as injection pressures are decreased below the optimum, the flow efficiency of the installation falls off very rapidly. Plotted data for other tubing back pressures, say 40 and 60 psia., and other oil-producing rates, say 10 and 20 bbl. per day, would expand the scope of the analysis.

In summary, the following points are made:

1. Maximum production at minimum theoretical horsepower requirement represents the most efficient lift conditions.
2. Use of the charts for solution gas-oil ratio and volume factor design data should be resorted to only in the absence of specific laboratory sample analysis.
3. A family of curves for different oil-producing rates and different tubing back pressures, to show the injection pressures for various assumed injection gas-oil ratios should be plotted.
4. From this family of curves, data should be secured and plotted, so as to represent injection gas-oil ratio vs. injection pressure and injection pressure vs. theoretical adiabatic horsepower.

Sea Provides Boiler Makeup Water

SEA water evaporators will be used to produce fresh makeup water for boilers operations in the $44,000,000 steam-electric generating plant Pacific Gas & Electric Co. is building at Morro Bay, near San Luis Obispo, Calif.

This is believed to be the first industrial application of ocean-water distillation anywhere in the nation although the process has been common aboard ship. Two fresh-water wells will be available for auxiliary use.

The evaporating system, designed by P.G.&E. engines and Bechtel Corp., contractor, will consist of two sets of sea-water evaporators. Each will be capable of supplying its boiler fresh water at the rate of 50 g.p.m. To produce this quantity of fresh water will require the processing of 150 gal. of sea water. Only enough water will be produced to satisfy plant needs.

The first of Morro Bay's two 150,000-kw. units will go into service next year, and the second is scheduled for opeartion in 1956. They will consume natural gas with fuel oil available on a standby basis.

How they operate . . . In brief, the evaporator systems consist of three horizontal cylindrical tanks, each 16 ft. long by 6 ft. in diameter. The lower half of each will contain 290 1-in. tubes, centered ⅞ in. apart.

Steam from the turbines will be used to heat these tubes and raw sea water will pass over them. In the boiling process thus created, steam from the salt water will be drawn from the top of the evaporator unit and will be condensed into fresh water for use in the plant.

Brine formed in the boiling process will be drawn off continuously at the bottom of the tank. The fresh water will be purified further before being injected into the main boiler feed water system.

Meters with audible warning devices will keep a check on the saline content of the sea water as it is expelled from the tanks, to guard against the formation of salt crusts around the steam tubes and tank interiors.

Special alloys are being used to fabricate the tanks and tubes.

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BEFORE . . . Here's the scene at Casmalia before Richfield began its rejuvenation program last fall.

AFTER . . . Today the scene is similar to that of any recently developed lease.

Casmalia—0 to 1,700 Bbl. per Day

. . . without drilling a single well

Revived California lease uses latest heavy-oil producing methods

D. H. Stormont
West Coast Editor

RICHFIELD OIL CORP.'S Soladino property in Casmalia field southwest of Santa Maria, Calif., jumped from zero crude production to more than 1,700 bbl. daily without a well being drilled.

The wells already were there, and had been for the past 30 to 35 years. But all had been idle since 1925, when the company took over the properties from Doheny Pacific Petroleum Co.

When the rejuvenation program was started last fall, there was little surface evidence of the field's existence. Only one building still stood. All roads had vanished. All surface well equipment had been junked. Occasional pieces of casing jutting a few feet aboveground were most prominent remnants of the earlier development.

The scene today, after an expenditure of several hundred thousand dollars, is that of any recently developed lease. New roads and power lines link the 20 wells which have been restored to production. Likewise, there is a new crude-gathering system. The latter, and the lifting, treating, and storage equipment being used, were designed for handling the 9°-gravity crude being produced.

Compared with facilities being used in other nearby heavy-oil fields, the Soladino lease is a model installation. But while all major items of equipment are new, sight was not lost of the fact that the property was partially depleted. It is anticipated, therefore, that a relatively good payout will be obtained.

When the lease was shut down the wells were capped but no special steps had been taken to stop corrosion. Despite having been closed in for about 30 years, however, only one well's casing was damaged so severely as to require replacement. Sour gases present in the wells during this long period evidently caused damage only where air had been admitted through a leaky cap. Lower portions of the 8¼ to 12½-in. casing strings were in remarkably good condition.

At wells not requiring casing replacement, the revival procedure was quite simple. With a servicing unit in place over the well, the old casing was cut off at ground level and a new tubing head provided. Next, approximately 15 bbl. of kerosine distillate was dumped into the well. After swabbing for a short time, rods and tubing then were run. Setting of electric-motor-driven pumping equipment completed the job.

Lifting equipment . . . Because of the heavy, viscous crudes being produced, it was desired to use a lifting unit with a slow, relatively long stroke. The one chosen was the small S. C. Carter hydraulic unit, with a 6-ft. stroke, whose electric power costs have averaged about 1 cent per barrel of produced crude.

The wells are pumped at rates varying from 0.9 to 1.4 strokes per minute. No counterbalancing is required, because of the heavy crude, so that the rods operate "free falling." Output per well currently averages 65 bbl. daily despite a few wells having relatively high water cuts.

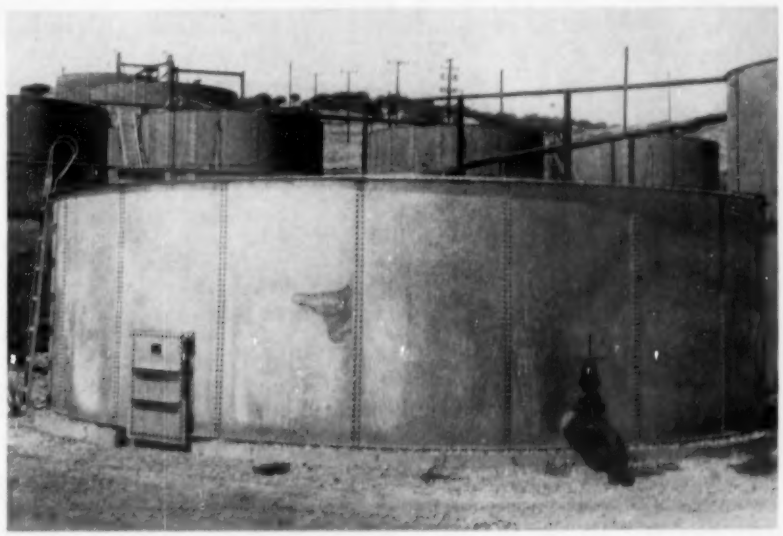
Pumps used are 4-in. liner type equipped with 3¾-in. plungers. They are run on 4-in. tubing, and are pumped with ¾-in. rods. Setting depth varies from around 550 ft. to 1,000 ft. Fluid levels are about at sea level and vary from 300 to 600 ft. depending upon elevations.

An interesting point in connection with the wells is that their static fluid level remains constant—at sea level—regardless of rate at which they are pumped. This unusual condition is assumed to be due to the field's aquifer being in communication with the Pacific Ocean, whose shore is about 6 miles west.

Dehydration of the 9°-gravity crude is accomplished by using these two 3,000-bbl. wash tanks in series. Through use of heat and chemicals, water cut is reduced from an average 60 per cent to approximately 2 per cent.

Diluents used . . . No diluents are injected into the wells as the temperature at the well head is sufficiently high, 110° F., approximately, for the crude to flow readily. They are, however, injected in the gathering system, which consists of 4, 6, and 8-in. pipe. Cutter stock currently being used is a 53° A.P.I. naphtha, introduced at the rate of about 125 bbl. for a 1,250-bbl. net daily crude production. Sufficient diluent, whether 34°-gravity gas oil or naphtha, is used to increase the 8°-10° crude to a shipped gravity of 12°.

The diluent is introduced into the crude at the end of each of five laterals in the gathering system. It is stored in a 1,000-bbl. tank on a nearby hill and brought to the points of injection through 1-in. distribution lines. A gear-type pump is used to assure that the pressure differential is sufficient, regardless of atmospheric temperatures, to force the diluent into the crude lines. Through use of adjustable chokes, volume of cutter stock introduced is proportioned to the net oil output of the wells connected to the lateral.



After being dehydrated in the two upper tanks, crude gravitates to the four 2,000-bbl. insulated storage tanks. Water removed accumulates in the 1,000-bbl. tank (immediate foreground) and is returned to the oil reservoir through a flank well outside productive limits.

Treating facilities . . . The 8-in. line which transfers the crude to the treating and storage battery, like all other crude lines thereafter, is steam traced. In the event cold weather congeals the crude, heat thus could be applied to keep it fluid.

Two three-ring, 3,000-bbl. insulated wash tanks are used in series to effect almost complete dehydration of a crude production whose water cut averages about 60 per cent. In the first tank, where the water level is held at 7.5 ft. by an automatic tank bleeder, the cut is reduced to about 18 per cent. In the second tank, where the oil-water contact is held at 4.5 ft. from bottom, the water is further reduced to about 2 per cent. Additional water separation is accomplished through the crude being retained 24 hours before being shipped.

Dehydration is accomplished through use of chemicals, introduced at the laterals along with the diluent, and by heating. By means of steam coils contained in the two wash tanks, is crude heated to approximately 185° F. Steam is supplied by two 30-hp. locomotive-type, automatically fired boilers. The burners are of the combination gas and crude-oil type but operate almost entirely on the latter as little gas is given up by the heavy crude.

As accompanying photographs show, the facilities are laid out so that the crude gravitates from the first wash tank to the second, and then to one of four 2,000-bbl. storage tanks. Water removed, some 2,000-bbl. daily, accumulates in a 1,000-bbl. tank at a still lower ground level. By means of high and low float-operated controls, water is automatically removed from the tank and returned by a triplex pump to the oil reservoir through a flank injection well outside the field's productive limits.

1932 . . . This service truck was the first put in the field by Lane-Wells. It paved the way for the modern equipment seen at the right.

1954 . . . Modern service equipment on location. This picture typifies the perforating and logging equipment giving around-the-clock service to the petroleum industry today.

PARTNERS OF INDUSTRY

Perforating Companies Reach Maturity

by James D. Hughes

THE distribution of perforating-service-company facilities in this country today is such that regardless of the remoteness of a location or the concentration of drilling activity in the immediate neighborhood, a simple telephone or radio call is all that is necessary to have a skilled crew and all the equipment needed at the well site within a reasonably short time. It has not always been like this.

Between the present, with its great diversity of perforating equipment, related services, and widespread availability, and the inception of the service, there is a span of some 22 years. In attaining its present status, the perforating-service industry has gone through periods of feebleness, growing pains, learning, development, adjustment, and acceptance of responsibilities. The existence of the strong, healthy, progressive service-company group of today is possible only as the result of the assistance, nourishment, encouragement, and wise counsel given it by the parent industry it serves.

The idea of using a gas-propelled bullet to effect underground casing perforation was not new in 1932 when it was first successfully applied at the end of an electrical cable in a California oil well. What was new was the means employed to convert a theoretical possibility into a practical actuality. The practice of opening up cased-off sands by perforation was not new because casing knives and rippers had been so employed for years. What was new was the speed and economy with which steel bullets could be made to accomplish an improved result, and without the limitation imposed by multiple casing strings and intervening cement.

Already the oil industry had entered into its equivalent of an "industrial revolution," a period of awakening awareness to the wastes and inefficiencies being suffered as a result of the incompleteness or absence of knowledge concerning the nature of reservoir fluids and the mechanics of their production. Already had begun the program of scientific inquiry, the development of a petroleum technology, and the application of engineering principles to all activities relating to the exploration, drilling, and production of oil.

New Concepts Arise

New concepts, new approaches, new objectives, made new demands upon men, methods, and material. In this driving quest, any device that gave promise of yielding new or additional subsurface information; of drilling faster, cheaper, more safely; of completing and producing more efficiently and more economically; was seized upon by the mounting numbers of the technically trained within the ranks of industry.

In this fertile environment the electrical log was rapidly achieving stature as a correlating tool and qualitative indicator. With logs before them indicating multiple separate sand developments, it soon became apparent to many that a new order of controlled selective completion would be possible by cementing a single string to total depth and using the newly developed gun perforator to open successive zones for test or production. It was tried. It worked. So numerous were the benefits of such a technique that the practice gave rise to additional developments which made for even more conveniences, more savings in time and money, and improved results.

Many new types of floating and cementing equipment were introduced. A wire-line bridging plug was developed which could be set at any position in a well by means of a setting tool cooperating with the gun-perforator cable and surface controls. Cement retainers, squeeze-cementing tools, and squeeze cementing appeared within a brief span and found universal acceptance. The modification of the early steel bridging-plug design to one of more easily drilled cast iron or magnesium reduced still more the time between spudding in and final completion.

This was the period of the "great shortage," when the organization pioneering gun-perforating service was confronted with a larger demand for the

Author is general sales manager Lane-Wells Co.

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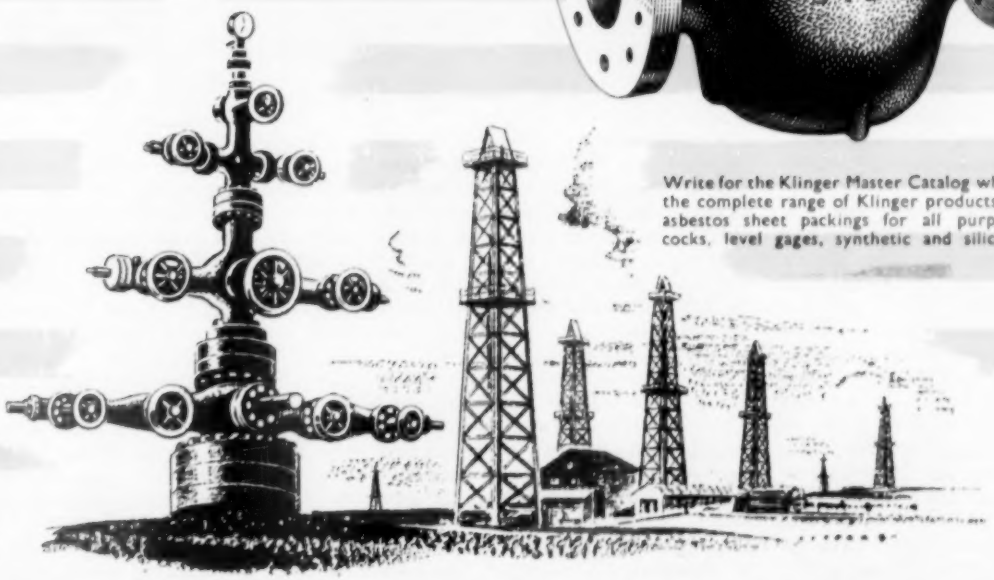

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service than could be satisfied quickly with the men and equipment available.

A number of strong and able perforating service companies grew up, each offering something new or different. With each new development of one acting as a goad to the others, and with industry cracking the whip over all of them in its demand for ever-improving performance and its exercise of free choice, there began a steady stream of improvements and new developments that grew more impressive each year.

Whereas the original gun perforator was designed to fire each bullet electrically and individually for maximum control and selectivity, others appeared in which all bullets were fired simultaneously either electrically, or by weighted go-devils sent down the customer's sand line to which the guns could be attached. For those more interested in speed than selectivity, this proved a welcome innovation. Although the go-devil-fired guns are rarely employed today, the simultaneously fired bullet gun enjoys a wide popularity because of the number of shots that may be fired in a single run.

The Parade of Progress

Other bullet guns were introduced which were semisimultaneous in nature, firing shots in banks of varying numbers of bullets and varying geometries. Special-purpose guns were developed to run inside tubing and perforate the tubing without penetrating the casing at the same time. Equally small but more powerful guns were designed to perforate drill pipe to establish circulation as an aid in recovering stuck pipe. By now it was possible for a customer to select from the combined offerings of the perforating companies almost any size gun or any size bullet from ½-in. diameter to ¾-in. By this time, too, had been developed a high-temperature powder and a technique which permitted perforating at great depths with temperatures up to 340° F., a temperature which years before would have caused premature detonation.

Long before the appearance of the perforating service company, an invaluable service to industry was being performed by organizations which had perfected ingenious tools to run on drill pipe to test the fluid content of formations exposed by the drill. Initially these tools were operated in open hole and their success depended upon the quality of the packoff that could be obtained with a rathole packer or a wall packer. The inception of the full-string completion made it possible to secure superior packoffs and the combination of the testing tool with a casing packer was employed to a greater extent than ever. In fact, so popular had become the shooting and testing of multiple zones that a new service was born which combined a testing tool with a gun perforator so that the two operations could be performed in a single round trip of the drill pipe.

FIRST SUCCESSFUL BULLET perforating job ever performed on an oil well. This eight-shot gun was fired on December 12, 1932, in a depleted well that was rejuvenated to produce for many years.

Unlike almost any other salable product which could be handled, torn apart, examined, put in service and tested, the product of a gun perforator was a hole, and with the hole many several thousand feet underground, no means had been discovered which would accurately reveal the presence of holes, their length, or their condition. In measuring penetrating ability of a single gun or between guns of varying ballistical components, the depth of penetration into a solid mild steel bar had become almost standard procedure. Because physical properties of commercial mild steel are remarkably consistent, this method provided a convenient and accurate basis for comparison.

Although this served the purposes of the design and testing engineers, it meant nothing to the man on the well who had several strings of heavy casing to perforate and to whom inches of penetration into a mild steel bar meant little. Consequently when he had a difficult job he preferred to believe the evidence of his own eyes. He would assemble short lengths of the casing of the size, weight, and grade he had in the hole, put one inside the other and ask the perforating service company to place its gun in it and fire. If the bullet got through he was satisfied. Sometimes he would place cement in the annulus. The sales engineers of the perforating companies used the same device in demonstrating the penerating ability of their respective wares. Frequently competing companies would be invited to perforate the same sample.

Comparison of Perforating Operations

In spite of apparent abilities to satisfactorily perforate pipe on the surface duplicated in the hole, many oil-company observers were sometimes puzzled over the variation in results being obtained from perforating. Some wells had to be shot repeatedly in the same zone before production could be obtained. Some wells came in at much

REPRESENTATIVE GROUP of experimental bullet types—each one designed to achieve a specific result. Only a few withstood the rigid tests of the labs and actual usage.

lower rates than anticipated. Hoping to throw some light upon this problem, one major oil company prepared a two-string target specimen, allowed cement to set between the strings, placed cross-pins in the inner string for a false bottom, and ran it to some 6,000 ft. in a well about to be abandoned. Several service companies in turn were called out to perforate the well.

After the last operation, the target casing was pulled and cut open for observation. The results were revealing and somewhat disappointing. A fairly large percentage of the total shots fired failed to completely penetrate the two cemented strings. There was also a lack of agreement between the depth of the false bottom and the placement of the perforations as measured by the oil company and as recorded by the service companies. A second specimen was prepared identical to the first except that it was run into the well with the cement uncured. Again the service companies took their turn at perforating, except that this time the conditions were explained and each company was told to bring its best penetrating gun. Upon retrieving the casing a great improvement was noted in the number of bullets that had completely penetrated both strings.

What Tests Accomplished

This test accomplished three things: It focused attention on penetration, it indicated the necessity of thorough advance knowledge of the job conditions on the part of the service company, and it launched a series of more detailed laboratory and field tests designed more fully to evaluate many of the factors affecting penetration. In the matter of a few years a wealth of data was accumulated, a large part of it from the cooperative testing programs of oil companies, which was extremely useful to the service companies in their diligent efforts toward penetration improvement.

At least one service company analyzed all its performance data from every source and developed ballistic data sheets for its sales engineers from which the total energy units required to penetrate varying amounts of steel and aged cement could be easily obtained. These units were expressed as "dorns" and each size and type gun as well as each powder load and bullet combination had a dorn rating. By analyzing the penetration requirements on any particular perforating job, the sales engineer was able to consult with the customer in the selection of the best combination to use and also to predict probable penetration into the formation. This approach went a long way toward assuring that every job was properly handled, and that only the equipment predetermined to be the most satisfactory to the customer would be used.

At the time more and more emphasis was being placed on penetration, a radically new development made its appearance. This was the now familiar shaped charge. This process required no bullet but effected perforation by means of a focused high-velocity force stream. In the smaller gun sizes particularly, the use of these charges resulted in vastly improved depths of penetration, and in the larger gun sizes it was only the latest bullet superguns that could approach the penetration of the shaped charge when designed for normal safe operation in casing.

Acceptance of the shaped charge by the industry was both immediate and widespread. To gain a better understanding of the abilities and limitations of this new perforator, a whole new series of comparative laboratory and field tests were run off by both oil and service companies. As more was learned, it was gradually recognized that under certain well conditions, best results could be achieved from the shaped charge, in others by bullets, and in still others by a combination of both.

Free-Point Indicators

The principle of the shaped charge was used in the development of ring charges by means of which tubing or casing could be cleanly severed in one quick trip into a well with an electric cable. Free point indicators made their appearance which enabled the operator to quickly and accurately locate the depths that cuts should be made.

Because of the minimum perforating effort involved in penetrating a single string of casing only, a shaped charge was developed having small enough dimensions that four such charges could be assembled in the same horizontal plane with 90° spacing. By using these special charges in a gun for perforating the casing at the point to be squeeze cemented, a more even distribution of cement behind the pipe is made possible and the chances for a successful squeeze job increased. The importance and

costs of squeeze operations being what they are, any reduction of the failure ratio through use of the squeeze gun can be considered a substantial net gain for industry.

In some of the earlier oil-company laboratory investigations of perforating effects on cement and formation material, microphotographs were taken which clearly indicated the compaction of sand grains occasioned by the passage of the bullet into sandstone cores. A similar condition was found in sandstone cores perforated by shaped charges. This condition together with certain peculiar cracking effects associated with both types of perforating might have accounted for some of the variation in well productivity from calculated, but not wholly.

Additional Experiments

Additional experiments were made in the laboratories and in the wells of several oil companies in which large formation cores were perforated by different type guns under varying heads of different types of well fluids. It was noted in addition to compaction there were varying degrees of perforation plugging according to the nature of the fluid in the hole. One company even demonstrated quantitatively the reduction of flow rates in cores resulting from plugging of bullet and shaped-charge perforations.

The perforating companies who had for years been unable to explain the meagerness or absence of results following jobs they were positive had adequate penetration, and who had made countless adjustments in billing as a consequence, can now share the onus with the well owner who instructs them to perforate in the presence of well fluids and other conditions conducive to formation damage and perforation plugging. Certainly this knowledge of the factors contributing to formation damage is a truly significant contribution by industry and one with tremendous potential economic implications. It can very well mark the beginning of a new era in well completion practices.

Permanent Tubing Type Completions

As a result of its understanding of these phenomena, one large oil company initiated an entirely new form of completion described as "permanent tubing type completion" in which the drilling fluids are replaced by water before perforating. Large savings in rig time are being reported as a result of this type completion initially with perhaps even more indicated during subsequent repair and recompletion operations. Success of this technique, however, depends largely upon the ability to lower a shaped charge gun through tubing and to adequately penetrate the casing and cement at the selected zone below tubing. A novel type of swinging charge carrier has recently been introduced which affords maximum penetration in spite of dimensional limitations.

Multiservices on One Cable

At various stages during the development of the perforating services, other and related services were acquired which functioned on the same electrical conductor cable. This condition made it possible for the customer to have several operations conducted on his well on the same setup rather than have several different service companies appear on the job separately. The convenience and savings from this integration have been considerable.

One of the most significant of these related services has been radioactivity well logging. The ability of the instruments used in this service to record the values of natural and induced formation radioactivity through several strings of casing has been of considerable value. Whereas initially the gun perforator was proved useful in the testing of known possibly productive zones before

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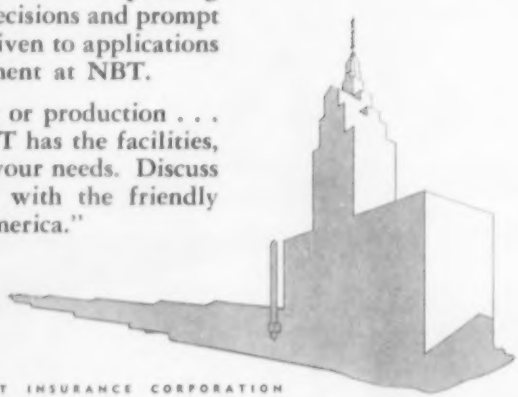

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well abandonment, the radioactivity log has made it possible to locate similar zones which, through the inadequacy of old driller's logs, were not known to exist. Numerous instances have occurred where the log has indicated such unsuspected cased-off sands, which, upon perforating, yielded substantial quantities of oil and gas. As a matter of fact, it has been said that entire new fields have been discovered by applying the same precaution to wildcat wells before abandonment.

Apart from its distinctive value in the complete radioactive logging service, the gamma-ray instrument alone with electrical collar locator has proved to be of very real service in resolving measure uncertainties. Whenever a gamma-ray log is made the position of every casing collar is recorded on the graph at the same time the curve is being generated. By examination of the completed log, any zone of interest can be located with respect to the nearest collar. Then by running the perforating gun with a similar electric casing-collar locator, the selected collar reference can be quickly located and the gun accurately positioned opposite the interval to be perforated. Unquestionably better and less-costly completions have resulted from the widespread utilization of this service convenience.

Dollars and manpower are convenient units for expressing resources, and the few statistics to follow will serve to illustrate the magnitude of perforating service company facilities at the end of 1952. In the case of those perforating companies having other major services, it is practically impossible to extract an accurate figure for perforating alone. The figures given, therefore, are the best approximations possible.

Total assets	$55,809,000
Total investment (Plant, property, equipment)	30,330,000
Total perforating sales	28,342,000
Total taxes	8,171,000
Total number employes	4,896
Number perforating hoists in service	502
Number field perforating service locations	321
Number employes directly engaged in perforating research and development	178

Petroleum Equipment Suppliers

The above figures were obtained from the Petroleum Equipment Suppliers Association and include only the perforating service companies which are members of that association. Since all the service companies of any consequence are members, the figures can be taken to be adequately representative.

One single reference to P.E.S.A. will serve to illustrate its value to industry. It was only by uniting, and using the association as their common agent, that the service companies, the manufacturers, and the supply companies were able to establish and maintain the necessary liaison with Government during the last war that made possible the acquisition of critical materials and components essential to the conduct of the oil industry's drilling and production program.

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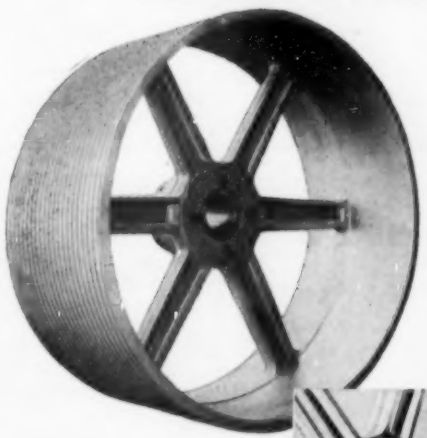

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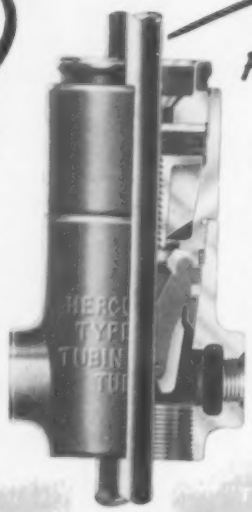

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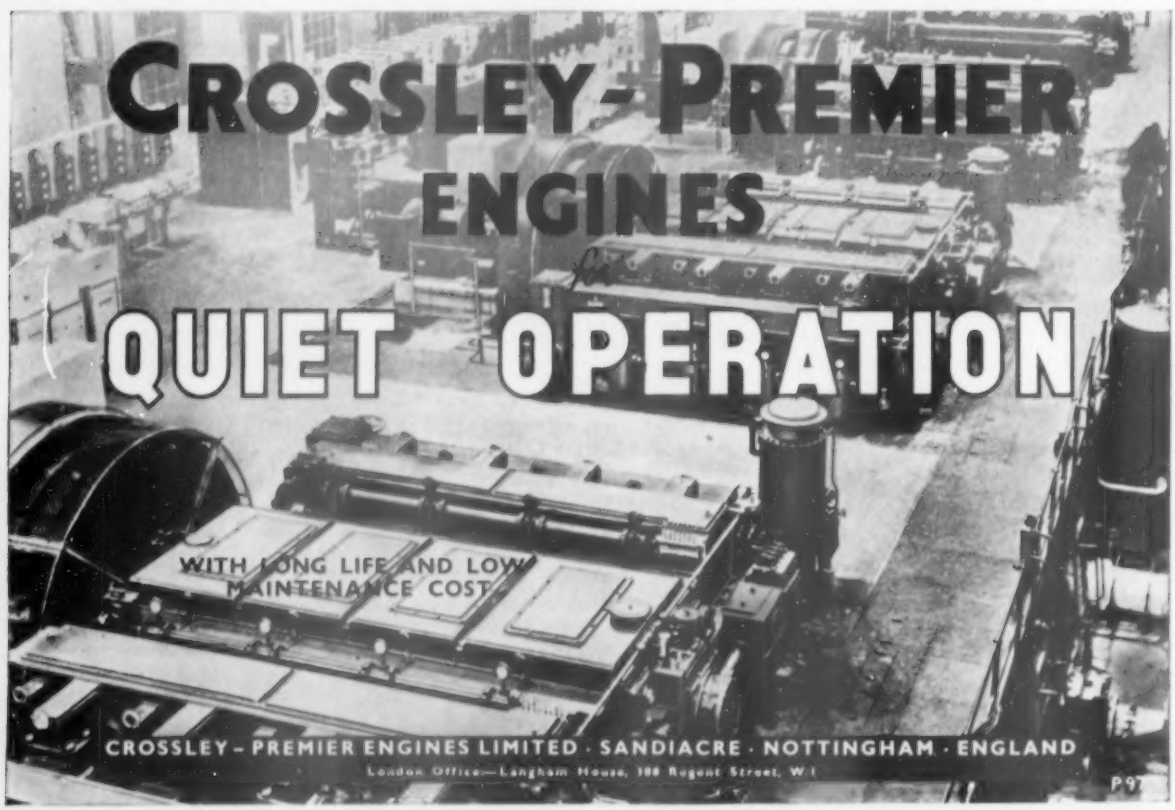

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by
Dr. R. F. Nielsen

Fluid Displacement in Linear Floods—7

Pressure Decline of East Texas Field

CALCULATION of the pressure-decline history of East Texas field from the tables of Hurst and van Everdingen was described in the last installment of this series. Table 1 shows the successive superpositions. Values of Δp were taken from large plots of the tables. According to the plots, it is immaterial, over the limited time range, whether the aquifer was assumed infinite or equal to the dimensions given. This means that the flow over r_w has all been due to expansion.

A new series of t's and Δp's is started when there is a change in rate. The Δp's are converted to actual pressure drops due to each superposition by the relation $\Delta p = \Delta p \; q/10{,}940$. The times of each change and values of $q/10{,}940$ were tabulated previously.

(Continued on page 109)

Author is associate professor of petroleum and natural-gas engineering, Pennsylvania State University.

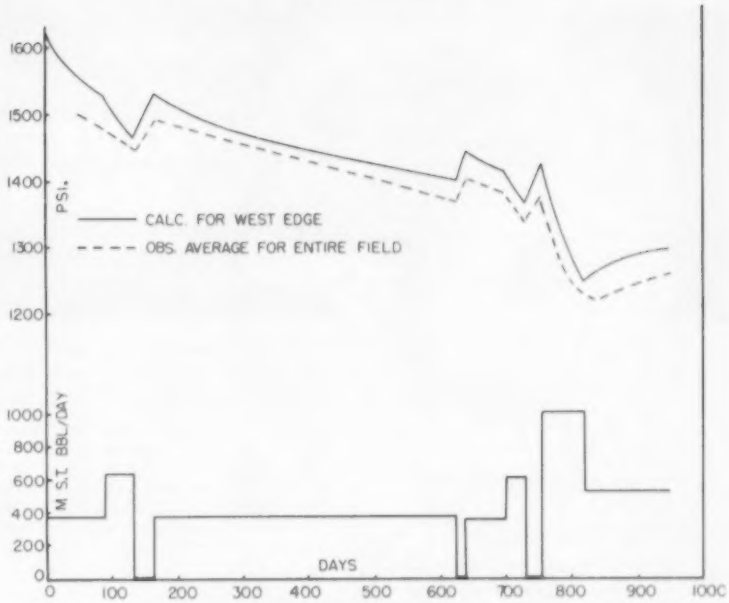

Fig. 1—Early production and decline history of East Texas field.

TABLE 1—CALCULATION OF PRESSURE DECLINE

t(da)	0	50	90	135	165	300	450	625	640	700	730	755	820	880	950
t	0	.008	.015	.022	.027	.050	.075	.104	.107	.117	.122	.126	.137	.147	.158
Δp	0	.10	.14	.16	.18	.23	.28	.32	.32	.335	.34	.345	.36	.37	.38
$\Delta p = \Delta p \times 673$		67	94	107	121	155	188	215	215	225	229	232	242	249	256
t			0	.007	.012	.035	.060	.089	.092	.102	.107	.111	.122	.132	.143
Δp			0	.095	.12	.20	.25	.30	.303	.32	.323	.33	.34	.35	.36
$\Delta p = \Delta p \times 491$			0	47	59	98	123	147	148	157	159	162	167	172	177
t				0	.005	.028	.053	.082	.085	.095	.100	.104	.115	.125	.136
Δp				0	.08	.18	.24	.285	.29	.31	.315	.32	.33	.34	.36
$\Delta p = \Delta p \times (-1{,}164)$				0	—93	—210	—280	—332	—338	—362	—367	—373	—384	—396	—420
t					0	.023	.048	.077	.080	.090	.095	.099	.110	.120	.131
Δp					0	.16	.225	.28	.285	.30	.31	.315	.325	.34	.355
$\Delta p = \Delta p \times 673$					0	107	151	188	191	202	208	212	219	229	239
t								0	.003	.013	.018	.022	.033	.043	.054
Δp								0	.06	.125	.13	.16	.19	.22	.24
$\Delta p = \Delta p \times (-673)$								0	—40	—84	—88	—107	—128	—148	—161
t									0	.010	.015	.019	.030	.040	.051
Δp									0	.11	.14	.15	.19	.21	.235
$\Delta p = \Delta p \times 646$									0	71	90	97	123	136	152
t										0	.005	.009	.020	.030	.041
Δp										0	.08	.11	.16	.19	.215
$\Delta p = \Delta p \times 445$										0	36	50	71	85	96
t											0	.004	.015	.025	.036
Δp											0	.07	.14	.17	.20
$\Delta p = \Delta p \times (-1{,}090)$											0	—76	—153	—185	—218
t												0	.011	.021	.032
Δp												0	.12	.16	.19
$\Delta p = \Delta p \times 1{,}820$												0	218	291	346
t													0	.010	.021
Δp													0	.11	.16
$\Delta p = \Delta p \times (-882)$													0	—97	—141
Total Δp	0	67	94	154	87	150	182	218	176	209	257	197	375	336	326
$p = 1{,}620 - \Delta p$		1,553	1,526	1,466	1,533	1,470	1,438	1,402	1,444	1,411	1,363	1,423	1,245	1,284	1,294

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ELECTRIC LOGGING—39

How the MicroLog Measures Resistivity

by R. I. Martin

BECAUSE of practical difficulties in interpreting limestone logs, particularly when the mud is saline so that the S.P. curve is very flat, new methods were investigated. The most promising of these is the MicroLog, which measures resistivities very close to the wall of the hole. No fluid loss can take place in a dense formation, so that there is no mud cake built up. Where the formation is permeable, however, a mud cake forms and also the invaded zone has a lower resistivity than the dense rock. The MicroLog measures these changes in resistivity with extremely short electrode spacings and consequently follows such changes in detail.

Fig. 1 shows the electrode arrangement used. Three electrodes, A, M_1, and M_2 are mounted on a rubber pad which is pressed against the wall of the hole by bow springs. The object of this pad is to exclude the drilling mud which would exert a strong short-circuiting effect on such closely spaced electrodes. The spacing between them is 1 in.

The design of the springs is such that pressure applied to the pad is nearly independent of the hole diameter within limits, as for example from 4½ to 16 in. The electrodes make direct contact either with the formation, or the mud cake in front of the formation.

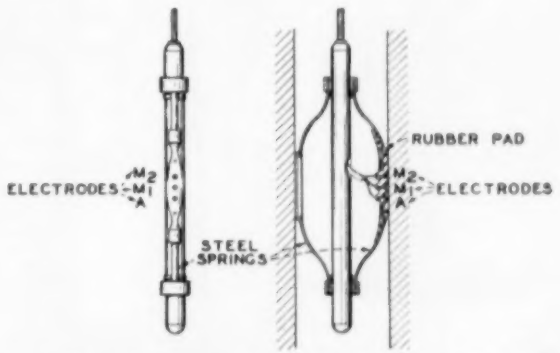

Fig. 1—Electrode arrangement in the MicroLog device. (From Doll, "The MicroLog . . ," A.I.M.E. Trans., Vol. 189, T.P. 2880).

*The author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

Fluid Displacement—7

(Continued from page 107)

The pressure decline is obtained for each time by adding the p's in each column. The results are plotted in Fig. 1, values of p having been subtracted from 1,620, the original pressure. The "flattened" production history is shown for reference.

Actually, the calculations do not show the sharp breaks in the pressure curve at times of sudden changes in production rate. These could easily have been demonstrated by taking values of t close to each change.

The average field pressure (from Muskat) are also shown on the graph. It will be noted that they are lower than those calculated. This is because Muskat, in determining the constants used here, estimated and allowed for the east-west pressure gradient in the field itself.

IN EAST TEXAS FIELD, proration has preserved the bottom-hole pressure so that almost all wells not watered out or producing water still flow. The size of the leases in the field, size of the field itself, and availability of electric power have led many operators to adopt automatic controls. The device shown here is electrically operated and enables the operator to flow the wells even during the morning tour when no pumpers are on duty.

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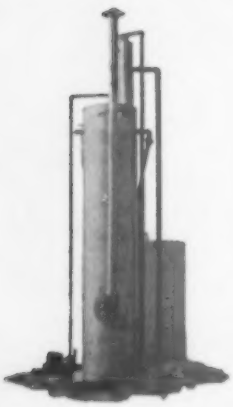

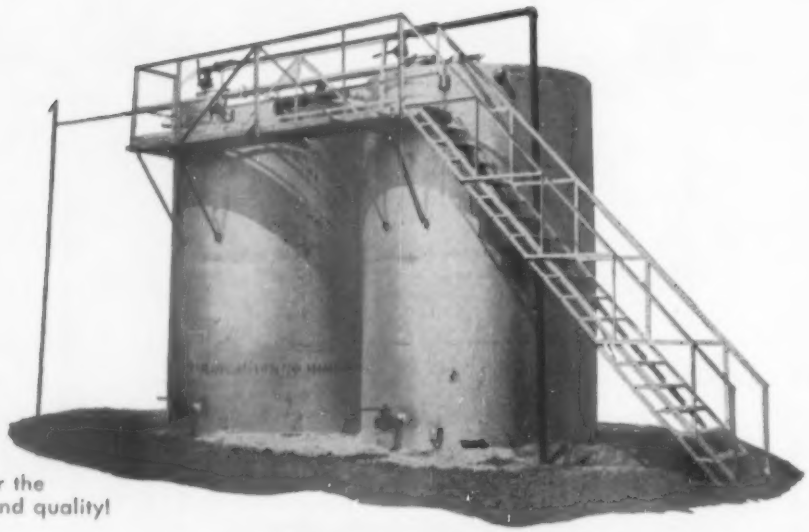

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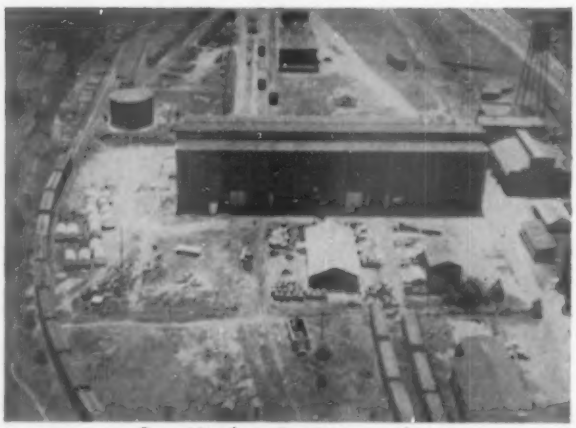

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How to Design In-Tank Jet Mixing Systems—3

FOR comparing mixing methods, several examples are investigated and the most economical mixing system indicated for each. For these examples power costs were determined assuming electrical charges of $0.01 per kw.-hr. Mixing times for in-tank jets were calculated using the method presented later in this bulletin, and mixing times for propeller mixers were estimated using data furnished by a propeller-mixer manufacturer.

Example 1 . . . A new refinery is to be constructed with the following blending facilities:

Blending tanks—Four 80,000 bbl., 120 ft. diameter by 40 ft. high.

Distance—Blending tanks to pumphouse, 2,000 ft. Pumphouse to barge loading dock, 5,000 ft.

Circulating pump specified—2,000 g.p.m. (2,860 bbl. per hour), 150-ft. head (for barge loading).

Piping specified—Pump suction, 12 in. from blending tanks. Pump discharge, 10 in. to blending tanks and barge dock.

Desired time for TEL addition—4 hours.

Blends per year—180.

Alternates for mixing:

RECIRCULATION

Required installation—Four 10-in. swing lines, one in each tank.

Time required—4 hours addition and 19 hours recirculation (considering increased pump capacity at low head).

Piping and pump utilized — 23 hours per blend.

Power per blend—1,170 kw.-hr. (for circulating pump).

Approximate annual power cost—$2,110.

PROPELLER MIXING

Required installation—Eight 24-hp. mixers, two in each tank.

Time required—4 hours addition and 3 hours mixing.

Piping and pump utilized — 4 hours.

Power per blend—478 kw.-hr. (for circulating pump and propeller mixers).

Approximate annual power cost—$860.

IN-TANK JET MIXING

Required installation—Four jets, 3.3 in. diameter, one in each tank. 150-psig. 100-g.p.m. eductor pump in place of 125 psig. 100 g.p.m. pump for other systems.

Time required—4 hours addition and 1 hour circulation.

Piping and pump utilized — 5 hours.

Power per blend—254 kw.-hr. + 17 kw.-hr. for additional power for eductor pump.

Approximate annual power cost—$487.

An analysis of Table 1 indicates that in-tank jets would probably be most attractive. Installation cost would be reasonably low, power costs are minimum, and piping and pump utilization times are short.

Example 2 . . . An existing refinery is expanding and has experienced difficulty in that gasoline is not mixed uniformly and pipelines to and from the blending tanks are overtaxed. The refinery has been recirculating through swing lines for mixing. Consideration is being given to improve this system. The following blending facilities are available:

Blending tanks — Eight 55,000 bbl., 114½ ft. diameter by 30 ft. high.

Distance blending tanks to pumphouse—2,500 ft.

Circulating pumps available — Three 1,500 g.p.m. (2,150 bbl. per hour) 250-ft. head.

Eductor pump available — 100 g.p.m., 225 psig.

Present piping—8-in. suction and discharge.

Desired time for TEL addition—3 hours.

Blends per year after expansion—350.

Present system—Recirculation is employed. TEL is added and the tanks are recirculated 21 hours.

For refinery after expansion:

RECIRCULATION

Required installation—Additional 8-in. suction and discharge lines from the pumphouse to the blending tanks and an additional 1,500-g.p.m. 250-ft. head circulating pump.

Time required—3 hours addition and 21 hours recirculation.

Piping and pump utilized — 24 hours per blend.

Power per blend—1,560 kw.-hr. (for pump).

Approximate annual power cost—$5,460.

TABLE 1—SUMMARY FOR EXAMPLE 1

	Recirculation	Propeller mixers	In-tank jets
Required installation	Four 10-in. swing lines	Eight 25-hp. propeller mixers	Four 3.3-in. jet nozzles*
Approx. annual power cost	$2,110	$860	$487
Piping and pump time for one blend	23 hours	4 hours	5 hours

*150 psig. eductor pump in place of 125 psig. for other installation.

TABLE 2—SUMMARY FOR EXAMPLE 2

	Recirculation	Propeller mixers	In-tank jets
Required installation	8-in. suction and discharge lines and 1,500-g.p.m., 250-ft. head pump	Sixteen 20-hp. propeller mixers	Eight 2-in. jet nozzles
Annual power cost	$5,460	$1,160	$875
Piping and pump time per blend	24 hours	3 hours	4 hours

TABLE 3—SUMMARY OF EXAMPLE 3

	Propeller mixers	In-tank jets
Required installation	Two 5-hp. propeller mixers	Two 1.5-in. jet nozzles and one 175-psig., 100-g.p.m. pump
Annual power cost	$60	$50

This material from E. I. du Pont de Nemours & Co., Inc.

PROPELLER MIXING

Required installation—Sixteen 20-hp. mixers, two in each tank (0.73 hp. per 1,000 bbl.).

Time required—3 hours addition and 1 hour mixing.

Piping and pump utilized — 3 hours.

Power per blend—331 kw.-hr. (for circulating pump and mixers).

Approximate annual power cost—$1,160.

IN-TANK JET MIXING

Required installation—Eight 2-in. nozzles, one in each tank.

Time required—3 hours addition and 1 hour circulation.

Piping and pump utilized—4 hours per blend.

Power per blend—260 kw.-hr. (for circulating pump).

Approximate annual power cost—$875.

An analysis of these facts leads to the conclusion that the present system must be supplemented and that in-tank jets would be the most economical installation and would result in lower power costs.

Example 3 . . . A small refinery has been mixing by recirculation. The gasoline has failed to meet specifications several times because of unsatisfactory blending. The decision has been made to alter the mixing system for quality reasons. The following mixing facilities are available:

Blending tanks—two 5,000 bbl., 35 ft. diameter by 30 ft. high.

Distance blending tanks to pumphouse—2,000 ft.

Elevation blending tanks above pumphouse—100 ft.

Circulating pump available—300 g.p.m. (430 bbl. per hour), 200-ft. head.

Eductor pump available — 100 g.p.m., 125 psig.

Present piping—4-in. suction and discharge.

Desired time for TEL addition—1 hour.

Blends per year—200.

Present system—Recirculation is employed. TEL is added and the tanks are circulated. Mixing is not satisfactory.

Alternates for mixing.

PROPELLER MIXING

Required installation—Two 5-hp. mixers, one in each tank (1.0 hp. per 1,000 bbl.).

Time required—1 hour addition and 1 hour mixing.

Piping and pump utilized—1 hour.

Power per blend—30 kw.-hr. (for circulating pump and mixers).

Approximate annual power cost—$60.

IN-TANK JET MIXING

Required installation — Present eductor pump does not have sufficient head. A 175-psig., 100-g.p.m. pump would have to be installed in its place, and a 1.5-in. jet in each tank.

Time required—1 hour addition and 15 minutes recirculation.

Piping and pump utilized — 1¼ hours.

Power per blend — 25.1 kw.-hr. (for recirculating pump).

Approximate annual power cost—$50.

In the comparison of Example 3, the two alternatives are close, and an accurate estimate for equipment and installation cost would have to be made to determine which is more economical.

Conclusion . . . It is evident that improved mixing offers advantages to refinery and terminal management in better quality control, lower operating costs, lower installation costs, and increased utilization of tanks, pumps, and pipelines. Two of the more attractive methods are in-tank propeller mixers and in-tank jet mixers, and these two alternatives should be considered when mixing installations are to be improved. In general, in-tank jet mixers will prove most attractive when:

1. Several tanks are to be used for mixing because there is only one source of power required.

2. Sufficient capacity and pressure pumps are needed or installed for other purposes and can also be used for circulating without alteration.

In-tank jet mixers may also be used for mixing other materials such as gasoline components and various petroleum products. A separate design procedure has been developed for these cases and is included in the design procedure section.

Design methods for in-tank propeller mixers may be obtained from mixer manufacturers. For mixing TEL and gasoline, a rapid design method for in-tank jet mixers has been developed and will follow in installments to come.

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A NEW roller method of coating industrial structures with aluminum paint can provide a realistic answer to the problems of cost and overspray, Sherwin-Williams Co. reports.

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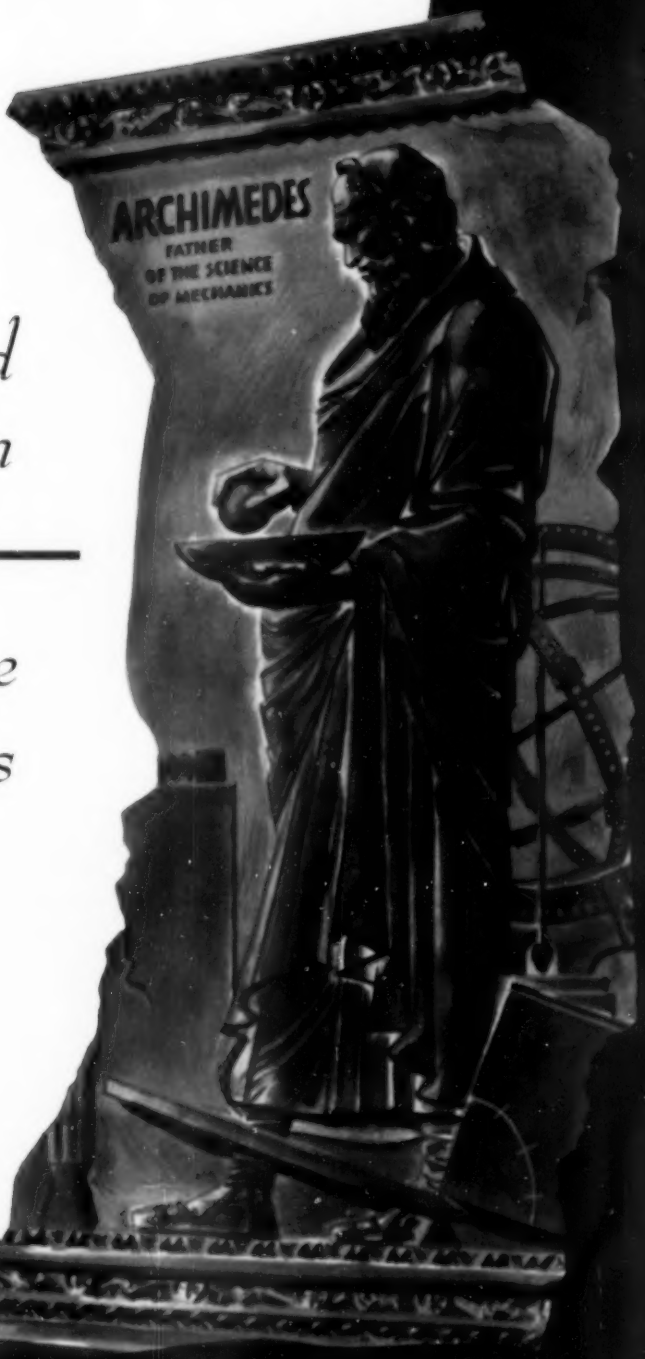

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Using More Natural Gas in Motor Fuels—1

by T. W. Legatski and H. J. Elder

• There exists at the present time, based on 1953 observations, an unsatisfied summer motor-fuel blending outlet for 4,200,000 bbl. per month of butane. If it is assumed that all of the extra needed butane came from natural-gas sources in the form of higher-vapor-pressure natural gasolines, the resultant monthly production of natural gasoline would be approximately 46 per cent greater than it now is and the product would average around 26 lb. vapor pressure.

• The antiknock effects which accompany the blending of butane to proven safe limits are appreciable. Thus, if it is assumed that the improvement in antiknock quality is credited to the higher-vapor-pressure natural gasoline, the improvement is of the order of 5 octane numbers.

• The ultimate limit for butane utilization in motor fuels has not yet been ascertained. However, a very considerable amount of information is available which indicates that the unsatisfied summer motor-fuel outlet for butane to be at least 50 per cent greater than the figure cited.

• Trends in motor-fuel quality over the period 1925 to 1953 indicate that the problem of fuel-system restrictions on the optimum use of light hydrocarbons is as important as ever but that the potential corrective measures are now limited to the adoption of pusher type pumps. With the more universal understanding of the nature of vapor lock and the proper corrective steps, it is anticipated that rapid progress will be made in the removal of the current restrictions.

THE two motor-fuel qualities which can affect natural-gasoline use are antiknock characteristics and volatility characteristics. Since in natural gasoline these two qualities are more or less directly related, we can dismiss for the time being the matter of antiknock quality and confine our immediate attention to volatility characteristics. Some may not agree with this approach. However, we believe that all can agree that volatility is the most important property in those cases where high-vapor-pressure natural gasolines are being blended.

Authors are with Phillips Petroleum Co., Bartlesville, Okla. From paper given at N.G.A.A. Dallas meeting.

Two Kinds of Volatility

Even the volatility-characteristics problem can be simplified if we differentiate between the two special kinds of volatility. Thus, completely debutanized natural gasolines are volatile products, yet their volatility is of a kind that can be absorbed in large quantities in finished motor-fuel products. Concentrations of at least 50 per cent of such natural gasolines can be incorporated in final blended products with many benefits and no adverse affects. The other kind of volatility is that contributed by butane either as such or in the form of the higher-vapor-pressure grades of natural gasoline. There is an unknown limit as to the amount of butane which can be incorporated in finished motor fuels without exceeding the capacities of car fuel systems to handle such fuels.

Vapor Pressure, Volatility and Vapor Lock

Failure of the pump to supply the needed fuel is invariably traceable to boiling of the fuel in the line around the pump inlet, with the result that the pump is called upon to handle, not the liquid product for which it was designed, but rather a mixture of liquid and vapor.

Most fuel systems can continue to meet the engine fuel requirements when the ratio of gasoline vapor to gasoline liquid at the pump inlet is 30 to 1 or even higher. Hence from a fuel-formulation viewpoint, our interest is in those fuel compositions which, at the prevailing fuel-system temperatures, will have vapor pressures equal to barometric pressures when the ratio of vapor to liquid is about 30 to 1.

V/L ratio . . . To a research man, this means that a typical car fuel system simulates a sort of special Reid-vapor-pressure test in which the vapor-liquid ratio of the test chambers is 30 to 1 or thereabouts, instead of the usual 4 to 1, and the test temperature is the fuel-pump inlet temperature of 130° F. or so, rather than the customary 100° F. with which we are so familiar. If we had such a test, we would find it invaluable for vapor-lock control purposes since all possible fuel compositions having the same vapor-lock characteristics would show the same vapor pressures in such a test.

Correlations . . . The 10 per cent point slope of the A.S.T.M. distillation curve correlated with the Reid vapor pressure is the currently accepted working tool of the fuel technologist in the matching of products to vehicle requirements. It is not a convenient tool, however, from the standpoint of blending fuels in the refinery, and it is probably less needed there than in research and development work since any particular blend will obviously be used in a wide variety of automotive vehicles. Therefore, for such purposes, experience has indicated that a combination of Reid vapor pressure and any convenient distillation point in the forepart of the A.S.T.M. distillation curve will suffice to control the fuel characteristics for general service use.

We thus find manufacturers using the 30, 40, or even 50 per cent evaporated temperatures for control purposes. In the present study the 30 per cent evaporated temperature has been chosen as the characterizing variable, chiefly for the reason that it is a commonly reported temperature in survey studies. Any other characterizing variable based on front-end distillation characteristics would have given the same results.

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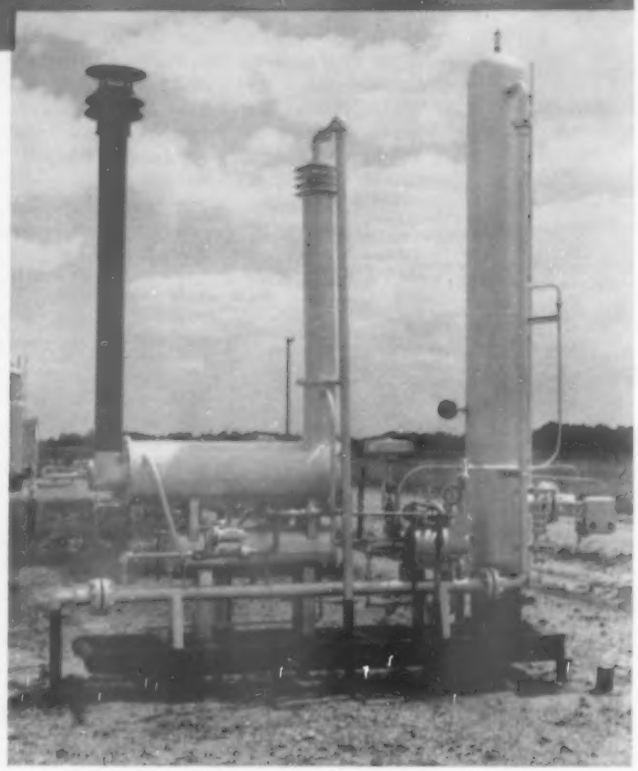

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by **W. L. Nelson**
Technical Editor

Application of Metals and Alloys in Petroleum Refining

Part 1

THE applications and services listed here and in the next several installments summarize much of the material published on the Progress in Metals page since January 1953. The compositions of the various alloys or steels listed here were published in the issues of September 14, 1953, and January 4, 1954.

Any listing of applications will obviously be incomplete and note especially that the most common materials such as gray cast iron, malleable iron, carbon steel, ductile iron, brasses, bronzes, etc., are seldom listed even though they may be used more widely than alloys or alloy steels.

Equipment, Corrosive Agent or Service	Some of the Materials That Have Been Employed*†
"Acid" refinery corrosion	Admiralty metal, muntz metal, brasses, cupro nickels
Most severe	Monel, Inconel, Hastelloys B and C, nickel metal
Acid sludge (sulfuric):	
Lines and pumps	Duriron, Tantiron, lead linings, Ni-Resist iron
Pumps	Monel, Hastelloys B, C, and D
Agitators—acid, caustic neutralization, doctor sweetening, etc.	Lead linings, Hastelloys A (best), Monel, Inconel, Worthite
Agitators (sulfuric acid):	
Bottom valve	Ni-Resist
Lining	Chemical and acid (silver free) lead
Shafts and impellers	Monel
Alkaline spray pond water	Red brass
Alkylation:	
Hydrofluoric acid	H-Monel
Anhydrous acid	Steel
Sulfuric	Carbon (Karbate), Hastelloy D, Duriron, etc.
Valves and pumps	Type 316 and sometimes Type 304 stainless steel
Alum evaporator (vapor)	Red brass, cupro nickel
Ammonium chloride	Tantalum metal, Hastelloy B, Monel
Ammonium hydroxide:	
Boiling	Carbon (Karbate)
Condensers and coolers	Aluminum alloys
Amyl mercaptan	Aluminum alloys
Antimony trichloride and hydrochloric acid	Nickel (or cladding)
Asphalt	Aluminum bronze
Bearings:	
Roller	Ni steel (carb.) and 2320 steel
Pins	Carb 2315, 3115, or 4615 steels
Bends	(See furnace, return bends)
Bolts or bolting:	
Cylinder connecting rods (compressors)	Q and T 4340 steel
Flanges (salt water)	Monel
General	Q and T 2330, 3140, 3240, and 4140; and carb. 4615
High-temperature creep strength	Normalized and tempered 1 Cr, 0.35 Mo, 0.25 Va, and 0.37 C steel
Low temperature, minus 150° F.	Q and T low Cr, Mo steel
Low temperature, minus 250° to 350° F.	3½ to 8½ Ni low-carbon steel
Return bends	Q and T 3140 and 4140
Submerged condensers and cooling towers	Copper silicon manganese alloys
Valves	Q and T 2330, 3140, 3240 and 4140; and carb. 4615
Brake bands	Cast Ni or Ni-Cr steels
Brake drums	Ni-Cr-Va, Cr-Cu, Va-Cu, and Mo-Cu cast irons
Brines (or dilute HCl)	(See hydrochloric acid or salt water)
Bubble caps	Cast iron, carbon steel
Sulfide corrosion (hot)	Silicon containing aluminum alloy, stainless steel, Ni-Resist iron
Acid-sulfide corrosion (below 450° F.)	Monel, nickel, Inconel
Bubble trays	Carbon steel or Cr steels as needed
Sulfide corrosion (hot)	Type 405 or 410 stainless, and Types 302, 304, 316, or 317
Acid-sulfide corrosion (below 450° F.)	Monel, nickel, Inconel (or clad)
Butadiene, butane, butenes	Carbon steel, aluminum bronze, cast iron, etc.
Cable or conduit (sulfide atmosphere)	Aluminum alloys
Calcium hypochlorite	Aluminum bronze, tantalum metal and Hastelloy C
Cams	Q and T 4340 steel
Carbon black paste	Stainless steel, cupro nickel, red brass and antimonial admiralty

*Abbreviations—Type (302, 316, etc.) means A.I.S.I. designations. Q and T means "quenched and tempered." HT means "heat treated." Carb. means "carburized and case hardened." Numbers as 3140, 2335, etc., refer to S.A.E. steel designations. Chemical elements—C, carbon; Ni, nickel; Cr, chromium; Va, vanadium; Si, silicon; Mo, molybdenum; Mn, manganese.

†Obviously, plain carbon steel, cast iron, brass, etc., are used for most services and they will not always be listed. Likewise, many materials have been omitted because their use has escaped notice.

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PZ-81-A

Among the Drilling Contractors

Kansas Rotary Rig Drills 90 Wells in Three Years

Empire Drilling Co., Wichita, Kans., recently completed its ninetieth well with a rig it has been operating less than 3 years. Hole drilled totaled approximately 360,000 ft., averaging about 4,000 ft. per well. The wells averaged 10 to 12 days each to complete, including moving and rigging time.

The rig, using a 96-ft. Lee C. Moore cantilever derrick, has a National T-32 draw works and a 7½ by 14-in. Ideal mud pump, and is powered by two sets of General Motors 6-71 twin diesel engines. It is operating in Schmied pool, in Graham County, Kansas.

Dan J. Kornfeld is principal owner and manager of the company.

Right: Empire Drilling Co.'s rotary rig, operating in Kansas, which recently completed its ninetieth well in a period of less than 3 years. Below: Dan J. Kornfeld (extreme left), owner and manager, with one of his crews, including (left to right) Jack C. Walker, driller; Dale Headley, derrickman; and Herb Brungard, and Richard Dunning, floormen.

Chandler Made Chairman Of Kansas Drilling Group

Collis P. Chandler, Jr., vice president, Musgrove Petroleum Corp., Wichita, has been elected chairman of the Kansas chapter of the American Association of Oilwell Drilling Contractors. He succeeds Robert E. Mallonee, Mallonee Drilling Co., Inc., also of Wichita.

Other newly elected officers are: H. L. Campbell, vice president R. W. Rine Drilling Co., and W. A. Michaelis, Jr., president, Trans-Era Petroleum, Inc., vice chairmen; and Charles M. Powell, Powell Drilling Co., secretary.

Bodard Drilling Co. has a rig working for Champlin Refining Co. at a wildcat location northwest of Keaton pool, 10 miles northeast of Okemah, in northeastern Okfuskee County, Oklahoma. Location is for 1 Shepard, in 2-12n-10e.

Penrod Drilling Co., Shreveport, is moving its rig from the deep test it drilled for Woodley Petroleum Co. 2½ miles northwest of Madisonville, in Madison County, Texas, to another wildcat location 6 miles southwest of town, where it will drill a 10,000-ft. test for the same company with Johnston Oil & Gas Co. and Signal Oil

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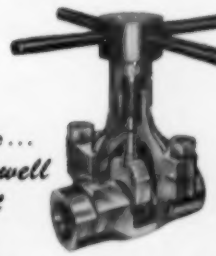

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& Gas Co. as joint operators. The new test is 1 Fuhlberg, in the Simon Jones Survey. The first test, 1 Fannie-Cannon unit, in the John Crownover Survey, was dry at 10,285 ft.

Santa Maria Drilling Corp., Long Beach, Calif., is drilling on a new 8,000-ft. contract it has with Intex Oil Co. for a Stevens test at a wildcat location east of production at Ten Section field, southwest of Bakersfield, in Kern County, California. The new operation is carried as 76-28 KCL, with location in 28-20-26.

Cable Tool & Rotary Drilling Co., Longview, Tex., is drilling a 5,000-ft. wildcat test for F. R. Jackson at 1 Sherman et al., in the W. W. Baker Survey, 3 miles northwest of Maydelle, in Cherokee County, East Texas. Location is 9 miles northwest of Wise field.

Advance Drilling Co., Mount Vernon, Ind., has moved a rotary rig from the Illinois basin area to Kanawha County, West Virginia, where it will drill on contract for Russell E. Bauer, of Detroit. Location of the rig is about 30 miles northeast of Charleston.

Joe Clark is contractor on a 5,500-ft. wildcat test Ammco Oil Co., of Houston, is starting about 15 miles northeast of Rio Grande City, in Starr County, Southwest Texas. Listing is 1 Gutierrez et al., in Survey 767. Nearest production is in Charco Blanco field, about 7 miles to the southwest.

Appell Drilling Co., Alice, Tex., is scheduled for a 6,000-ft. Navarro test to be drilled for McCauley, Wood & McCauley, of Houston, at 1 Harris, in the William Webber Survey, 4 miles northeast of Dilley, in Frio County, Texas. Rig for the test has been working in Webb County.

Big "X" Drilling Co. and **Lynn Drilling Co.** have the contracts for two step-out exploratory tests Carter Oil Co. is starting in the Camrick-Morrow sand gas area in southeastern Texas County and southwestern Beaver County, Oklahoma Panhandle. The former will drill 1 Archie Campbell, in 1-1n-19eCM, with contract to 5,900 ft. The latter has 1 State-Sutton, 4 miles to the west in Section 5. The tests are the first for Carter in the area. Locations are on the Texas County side of the line.

Barnwell Drilling Co., Shreveport, has a new 6,500-ft. operation under way in Bethany field, Panola County, East Texas, where it is drilling for Argo and Debardeleben. It is at 1 Roberts, in the Daniel Tuttle Survey.

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REFINING

Extract Yield High

Udex process increases production of aromatics

NEW YORK.—The potential domestic production of benzene, toluene, and xylenes could be increased tenfold by direct Udex extraction of unsaturated cracked naphthas.

This possible new source for a growing class of basic chemicals was revealed at the annual American Chemical Society meeting by H. S. Bloch and R. C. Wackher of Universal Oil Products Co.

The recovery of pure aromatics from any particular cracked stock depends on the types of unsaturated compounds present, their amount and the means for separating them from the extract. Udex extraction followed by a clay treat of the extract would yield nitration-grade aromatics if certain classes of unsaturates are absent from the thermal or catalytic cracked naphthas. These classes, the conjugated dienes and alkenylaromatics must be removed from the feed stock or extract by selective hydrogenation, such as Unifining or Platforming.

The Udex process is employed commercially to extract benzene, toluene, and xylenes from catalytically reformed naphthas which show a high aromatic content. This extension of the extractive technique to the tremendous volumes of highly unsaturated cracked naphthas available in this country, points to a possible economic source of such basic aromatics in the future.

Ammonia Plant Opened

LAWRENCE, Kans. — Consumers Cooperative Association has put its $8,000,000 ammonia plant here on stream.

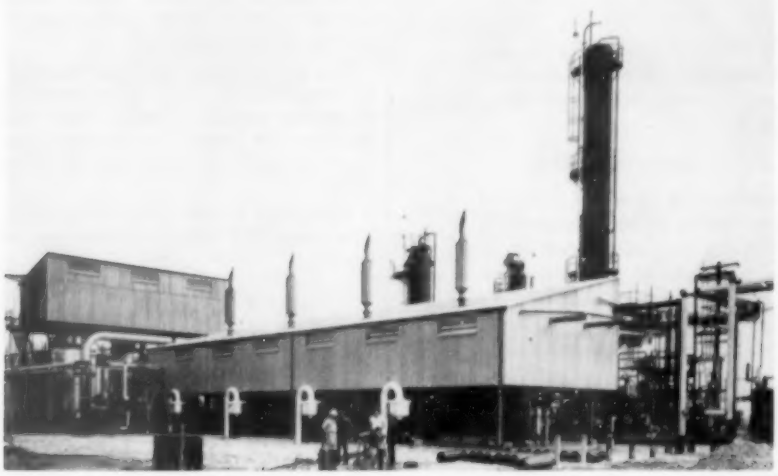
Located in a state long known for its farming activity, the plant will meet a demand for nitrogen products that has increased nearly 500 per cent in the past 8 years.

Foster Wheeler Corp. of New York designed and built the plant which has a capacity of 180 tons a day of anhydrous ammonia. Once planned to use fuel oil for a feed stock, the plant was finally designed to use natural gas.

Danaho Starts Expansion

HOUSTON.—Danaho Refining Co. has started construction of a new Platforming unit as part of a $2,671,000 expansion program at its Pettus, Tex., refinery.

The new unit will produce high-



Electronically Controlled Catformer in Operation

A new Catformer unit, the first in the country in which all instruments and controls are of the electronic type, has gone on stream at Atlantic Refining Co.'s Port Arthur, Tex., refinery. The unit, utilizing a special catalyst developed by Atlantic and Atlantic process design, converts naphtha into high-grade gasoline. It was designed and built by H. K. Ferguson Co. of Cleveland and New York. The heavy process equipment is supported by 240 wood piles driven to an average depth of 45 ft.

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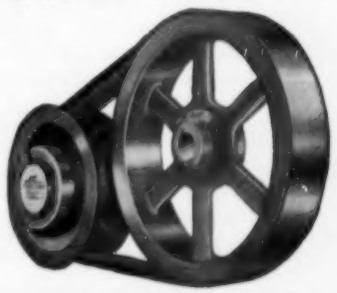

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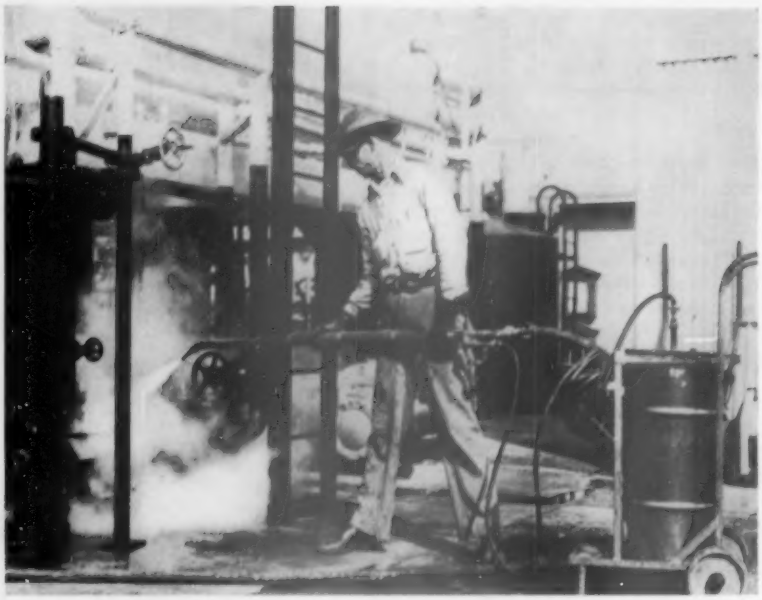

Cleaning Maintenance Cut from Days to Hours at Western Refinery

Refinery finds Oakite Detergent applied with Oakite Steam Gun makes short work of cleaning prior to repainting.

THE cleaning problem this California refinery had was simple enough. It was one of removing all dirt, grease and muck from tanks, pumps and similar equipment. But actually doing the job was not so simple. It meant tedious scraping, wirebrushing, wiping by a sizable crew. It involved struggling with hard-to-get-at surfaces. Did the Oakite Man have a better answer?

He did—as a result of his wide refinery cleaning experience. For this particular case, he suggested the Oakite 384 Steam Gun. He helped Maintenance get started that morning. By afternoon, the plant superintendent stated, "One man did about two weeks' work today".

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octane base stocks for the manufacture of premium-grade gasoline, according to D. W. Hovey, president. It is scheduled to be in operation by January.

Danaho's expansion program also will include construction of a new catalytic cracking unit and polymerization units, in addition to revamping of existing facilities.

Benzene Survey Started

WASHINGTON.—The Business and Defense Services Administration is starting an industry-wide survey of benzene production and consumption.

Questionnaires have gone out to the 60-odd leading companies concerned to obtain data for use in making forecasts of military and essential civilian needs.

Manufacturers are asked to state their present and projected productive capacity, last year's output, this year's estimated production, and raw materials consumed in making 100 gal. of benzene by grade. Individual company figures will not be revealed in information to be released when the survey is complete.

New Fuel Introduced

PITTSBURGH.—Gulf Oil Corp. is following the removal-of-heavy-ends route to combat engine deposits and preignition.

In announcing its new "Super-Refined Gulf No-Nox" gasoline, the company explained that it removes more than a cupful of "dirty-burning tail-end gasoline" from each gallon of fuel in the new process.

The new gasoline, said to be unusually clean-burning, relies on no additives to prevent engine deposits. Theory behind the new process is to prevent such deposits from forming in the first place.

Gulf says it has spent $60,000,000 developing facilities for production of the fuel.

Sohio Expands Refinery

CLEVELAND. — Standard Oil Co. (Ohio) is spending $750,000 revamping its light-ends facilities at its No. 1 refinery here. The work will increase the recovery of light-ends, expand the catalytic gas plant to conform with increased cat cracking operations, and will permit introduction of a new type of catalyst in the polymerization unit. Other improvements at the refinery include a new asphalt fume burner and a yard flare.

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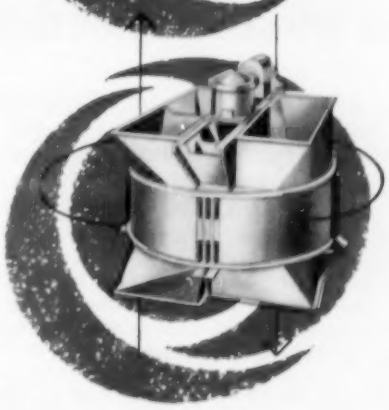

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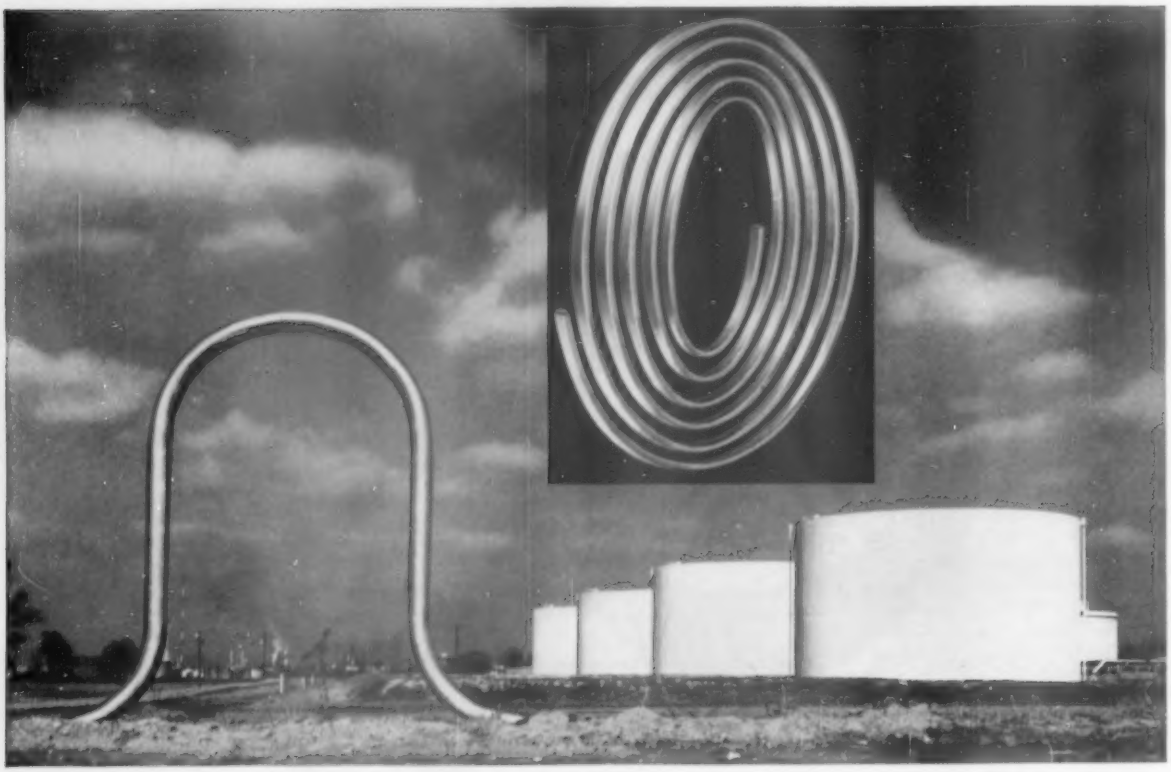

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Given reasonable conditions, Galvo-Line can be installed at rates upward of 3,000 feet per hour—the equivalent of installing 35 Galvo-Paks® in the same time. Connection-making costs are also reduced—one connection every 500-1000 feet will usually suffice. Uniform distribution and efficient utilization of current contributes greatly to Galvo-Line's economy and dependability in galvanic pipeline protection.

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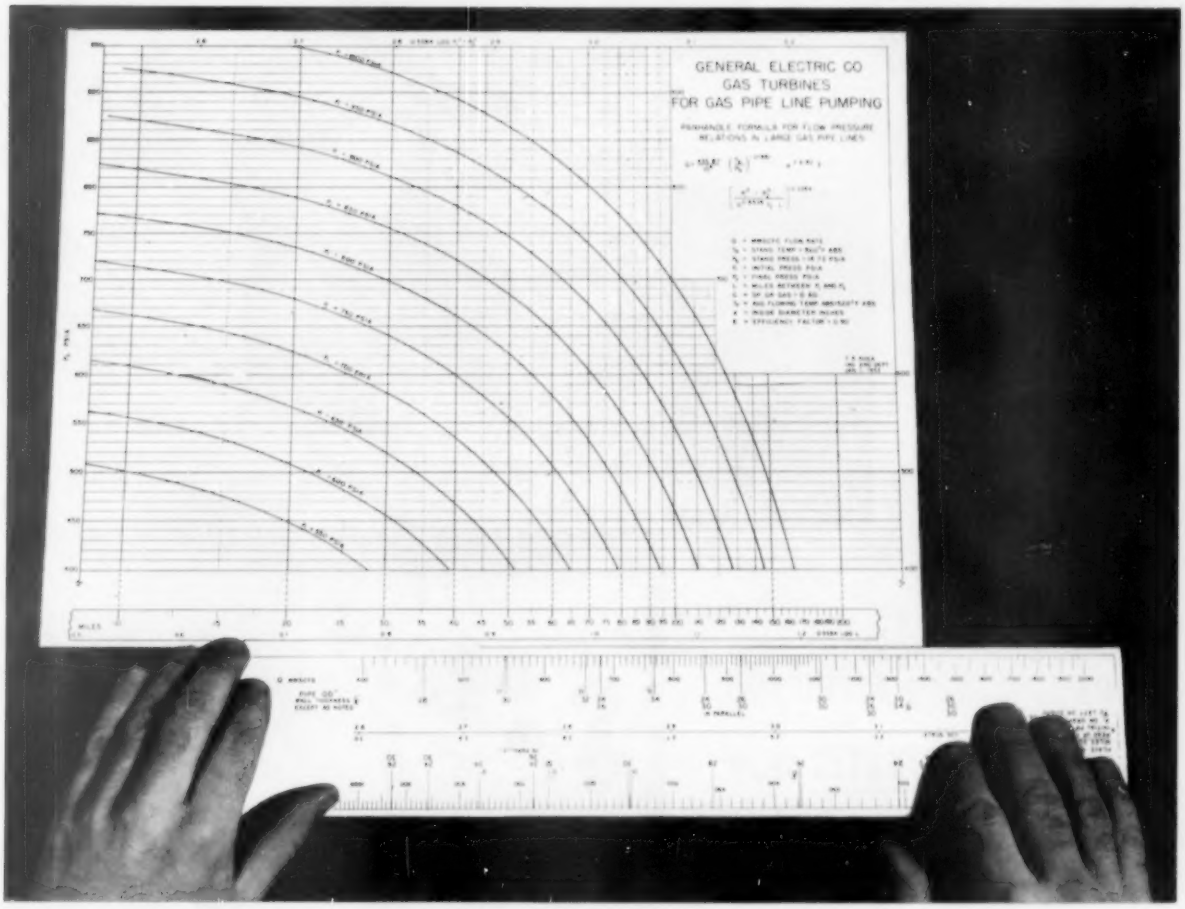


Fig. 1—Slide rule, based on the "Panhandle" flow formula, for solving pressure-drop problems in gas pipelining.

This new gas-pipeline slide rule offers you. . .

Quick solutions to gas-flow problems

by T. R. Rhea

DO you, as an engineer for a gas pipeline company, object to making long and complicated calculations to determine pressure drop along a gas line? If so, the slide rule pictured in Fig. 1 can be of great value to you.

An example of its use is in calculations concerning the selection of sites for booster compressor stations on an existing line. In the application of gas-turbine-driven centrifugal compressors to large-diameter gas pipelines, it is frequently necessary to determine the pressure drop along the line and then, at intervals of 50 miles or so, place centrifugal compressors to boost the pressure back up to maximum value.

It is the purpose of this article to describe a slide rule that can determine such pressure drops simply and easily and thus avoid laborous calculations that would otherwise be necessary in solving one of the flow formulas. A number of slide rules have been developed to solve these formulas, but this one is convenient for the specific purpose.

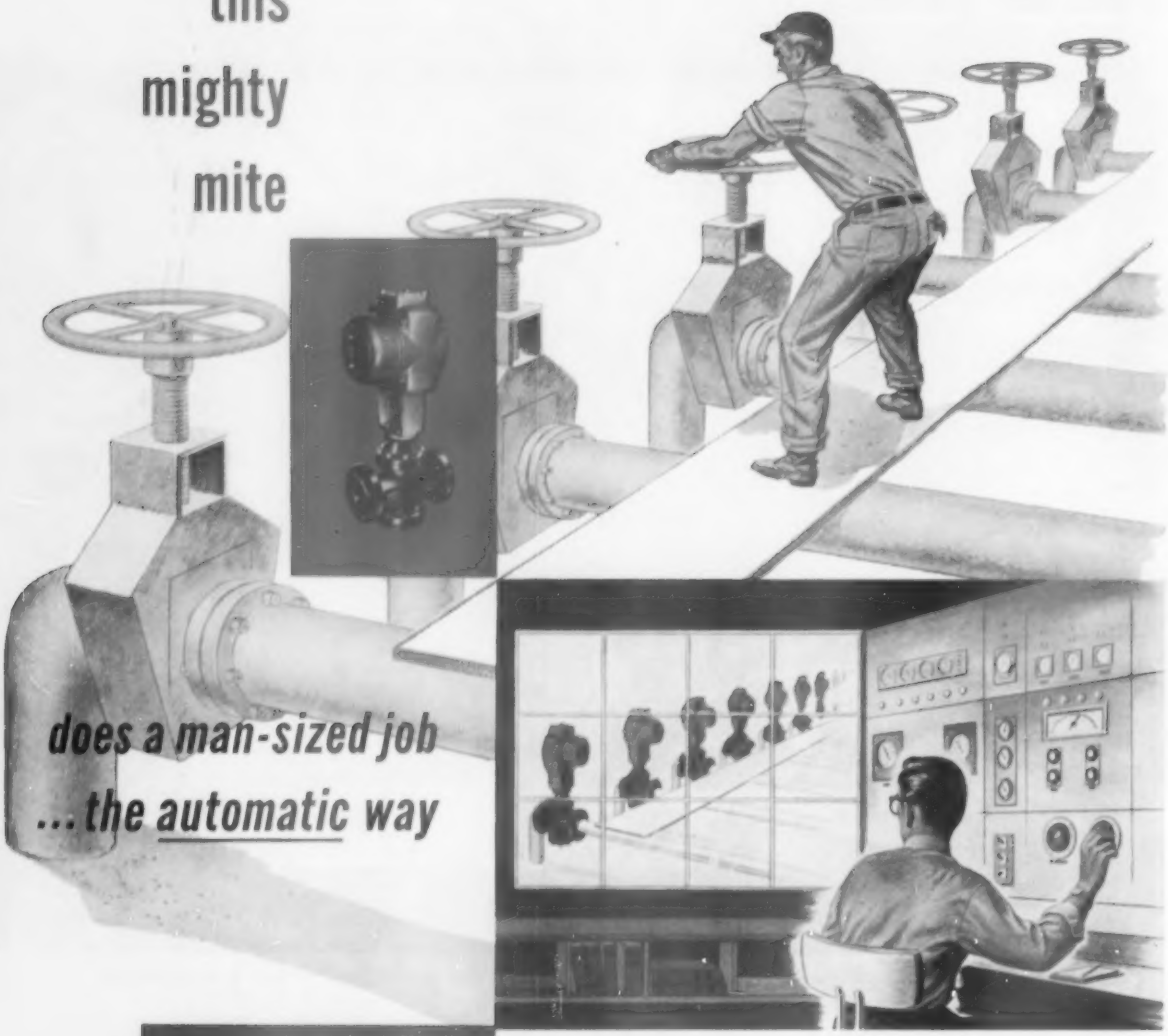
For instance, suppose you are given a 30-in.-diameter pipeline suitable for a maximum working pressure of 800 psia., and you wish to transmit 500 M.M.s.c.f.d. a distance of 200 miles.

The pressure drops as the gas flows along the pipe, according to a particular formula, and it is boosted back up to working pressure periodically, as shown in Fig. 2. The 50-mile spacing of the boosters is for illustration only since one of the problems is usually to determine at just what intervals it is economical to boost the pressure back up to maximum working pressure.

Flow formula . . . One of the formulas

*Manager, chemical and petroleum engineering, industrial engineering section, General Electric Co., Schenectady, N. Y.

this mighty mite



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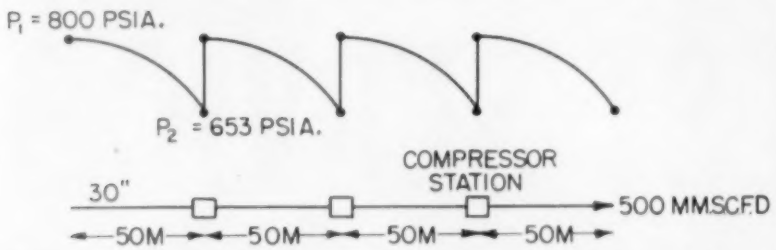

Fig. 2—Typical curve of pressure versus distance on large-diameter pipeline. Numerical values on curve refer to problem in Example 1.

commonly used for pressure-flow calculations is the Panhandle formula (Equation 1):

$$Q = (435.87/10^6)\,(T_b/P_b)^{1.07881}\,d^{2.6182} \times E\,[(P_1^2 - P_2^2)/(G^{0.8539})\,(T_f)\,(L)]^{0.5394}$$

where:

- Q = M.M.s.c.f.d. flow rate. (Standard is at the base temperature and pressure.)
- T_b = base temperature = 520° abs. (60° F.)
- P_b = base pressure = 14.73 psia.
- P_2 = pressure at L miles downstream from P_1 when Q is flowing.
- G = special gravity of natural gas (air = 1.0).
- T_f = average flowing temperature, absolute.
- d = inside diameter of pipe in in.
- E = efficiency factor.

Such formulas rarely give very exact results regardless of the number of decimal places to which it is calculated. Therefore, the pipeline calculator adds an "experience" or factor E, to make the calculated results more nearly conform to reality. E factors of 0.8 or 0.9 are commonly employed. Such E factors also change with time as the line fills with liquid in the low places and from other causes.

The formula can be simplified to:

$$Q = 790.2/10^6 \times [(P_1^2 - P_2^2)/L]^{0.5394}\,d^{2.6182} \quad (2)$$

when:

- $T_b = T_f = 520°$ absolute (60° F.).
- $P_b = 14.73$ psia.
- $G = 0.60$.
- $E = 0.9$.

This slide rule is constructed for these values.

Change of constants . . . The specific gravity from some fields may be as high as 0.65 to 0.68. For example, if the flow is 500 M.M.s.c.f.d. of 0.65 specific-gravity gas the slide rule can be used by using 518 M.M.s.c.f.d. or 1.037 times greater.

Similarly, if the flowing temperature is 80° F. instead of 60° F. for which the slide rule was constructed, the slide rule will give accurate results if the actual flow is increased by a factor of 1.02.

While the slide rule is made up for an efficiency of 0.9, use of the slide rule for another efficiency is accomplished in the same manner. For example, if the actual efficiency is 0.85 and the flow is 500 M.M.s.c.f.d., then the slide rule should be used as if the flow were:

$$0.9/0.85 \times 500 \text{ or } 529 \text{ M.M.s.c.f.d.}$$

If the slide rule is to be used for 0.65 specific-gravity gas, 80° F. flowing temperature, and 0.85 efficiency pipe and for a flow of 500 M.M.s.c.f.d., then the slide-rule point would be 560 M.M.s.c.f.d. or the product of all three factors.

Rearranging Formula 2 and taking the log, it becomes:

$$\log Q + \log [10^6/(790.2)\,(\Sigma\, d^{2.6182})] + 0.5394 \log L = 0.5394 \log (P_1^2 - P_2^2) \quad (3)$$

The reason for the summation of pipe diameters is that when several pipes are in parallel, the total flow Q through them is so expressed as the sum of their several diameters each raised to the power.

The term 0.5394 log L is plotted on the graph of the pressures merely for convenience, but with the proper relationship to it.

Similarly, the log of the factor containing d is plotted on the movable strip with the log Q.

Typical problems . . . The best way to explain the operation of the slide rule is to go through the steps in a few typical problems.

Example 1. Determination of downstream pressure on single line.

Given:

Pipe diameter—30 by $\frac{3}{8}$-in.
Flow—500 M.M.s.c.f.d.

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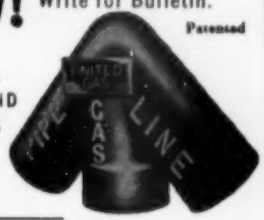

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PIPELINE PATROL

Initial P_1—800 psia.
Miles—50.

Problem: To find P_2, 50 miles down the line from P_1.

(a) Place the diameter of the 50-mile mark at the bottom of the graph.

(b) Read up from the flow, (500 M.M.s.c.f.d.) to the curve labeled $P_1 = 800$.

(c) The answer given at the left of the graph is 653 psia. $= P_2$.

Example 2. Solving for downstream pressure with changed line constants.

Given:

Pipe diameter—28 by $\frac{5}{8}$-in.
Flow—350 M.M.s.c.f.d.
Initial P_1—900 psia.
Miles—40.
Efficiency—0.85.

Problem: To find P_2 at the point 40 miles downstream.

(a) Something new has been added here, since the scales have all been made up for E = 0.90. However, for an efficiency of 0.85 this looks exactly the same to the pipeline as a slightly greater flow with E = 0.90.

$$\text{Precisely: } \frac{350 \times 0.90}{0.85} = 371 \text{ M.M.s.c.f.d.}$$

(b) Place the 28-in.-diameter point on 40 miles on the scale at the bottom of the graph.

(c) Read up from 371 flow to the curve for $P_1 = 900$.

(d) The answer given at the left of the graph is 820 psia. $= P_2$.

Example 3. Solving for downstream pressures in paralleled or looped lines.

Given:

30 miles of 26 and 30 in. in parallel, then 30 miles of 30 in. alone.
Initial pressure—800 psia.
Flow—650 M.M.s.c.f.d.

Problem: To find P_2 at the end of the 60 miles of line.

This is solved in two steps:

(a) Place the 26 and 30-in. point on 30 miles at the bottom of the graph. Read up from 650 M.M.s.c.f.d. flow to the 800 psia. initial-pressure curve. The pressure at the end of the looping is 750 psia. as read at the left of the graph.

(b) Place the 30-in. point on 30 miles at the bottom of the graph. Read up from 650 M.M.s.c.f.d. flow to the 750 psia. initial-pressure curve (which is the initial pressure on the single pipe) and read the final pressure, 595 psia., at the left of the graph.

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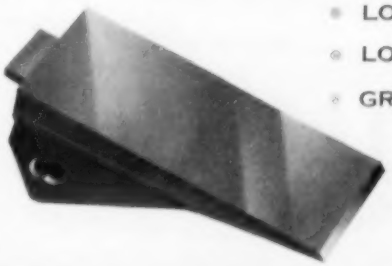

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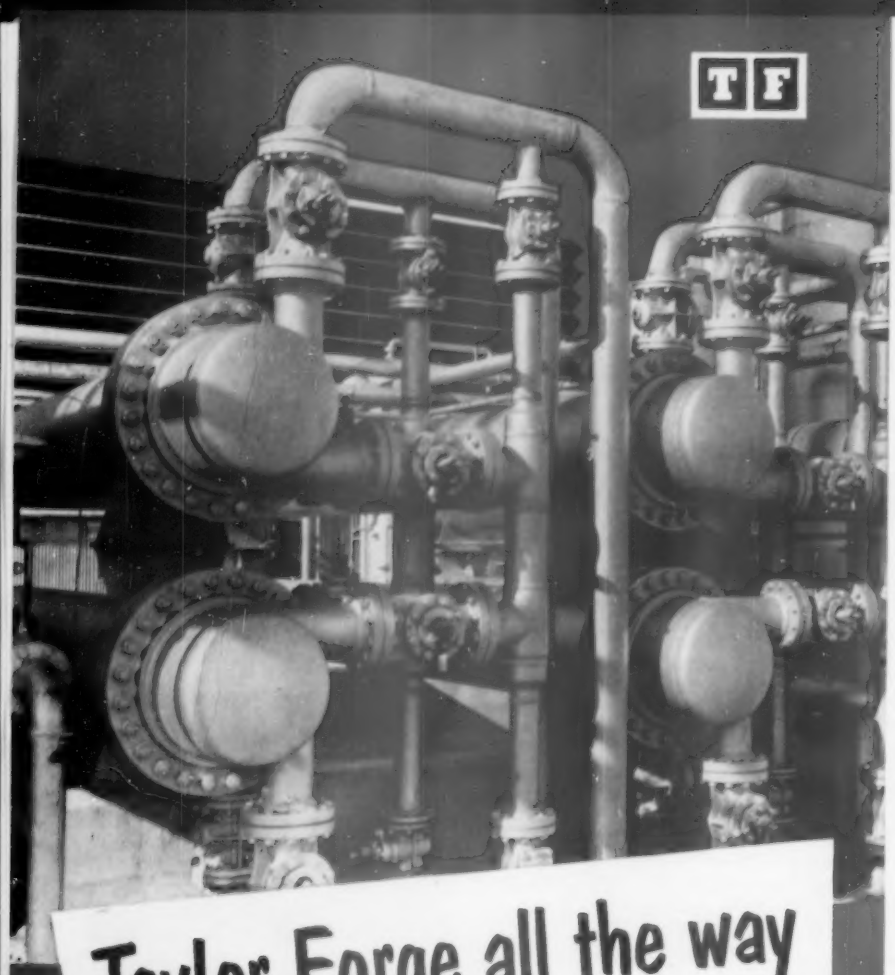


Taylor Forge all the way

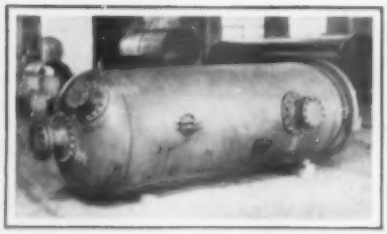
Throughout the power and process industries you will see hundreds of model installations like this where someone who wanted to be sure has specified Taylor Forge all the way through... WeldELLS,® flanges, welding necks, nozzles.

Whatever your needs—simple or complex—it will pay you to *use* all the way through, the products that have *led* all the way through.

See your Taylor Forge Distributor for up-to-the-minute facts.

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS • General Offices and Works: P.O. Box 485, Chicago 90, Illinois • Offices in all principal cities Plants at: Carnegie, Pa.; Fontana, Calif.; Gary, Ind.; Hamilton, Ontario, Canada



A New Development that's 37 Years Old

When you cut a hole in the shell of a pressure vessel you of course weaken it. But, how much?...or, to put it another way, how much reinforcement is necessary to make the shell surrounding an opening as strong as any other part of the shell?

In the old days of low pressure and over-sizing that hadn't been much of a problem. But when pressures began to climb fast (about 1915) it became a tough one.

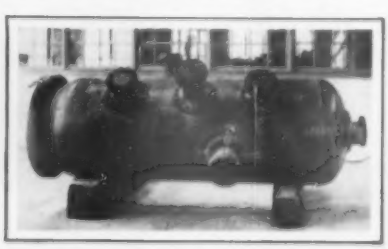
Taylor Forge had already begun to relish problems like this: had pioneered the forged steel flange; was playing a major part in the development of flange and piping standards. So it isn't at all surprising that Taylor Forge again came forward with the solution — the first seamless forged steel pressure vessel nozzles.

The research and testing that Taylor Forge put into designed pressure vessel outlets dates back to the riveted, sweep nozzles that are still giving safe, satisfactory service. But as riveting gave ground to welding, still more critical analyses were made to determine the exact requirements of nozzles designed for welding.

These many years of tests and studies were fully summed up in a paper entitled "Effects of Openings in Pressure Vessels" which was presented by the late J. Hall Taylor and Professor E. O. Waters at the June 1933 meeting of the ASME. It is still authoritative in this field.

Yes, a new idea that is 37 years old! So thoroughgoing was its first development—so critical the steps taken to maintain its leadership—that today Taylor Forge Seamless Nozzles and Welding Necks are the standards of the entire pressure vessel and piping industry.

An episode in the story of Taylor Forge leadership in designed piping



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. . . Use These Handy Time-Saver Cards

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Mark here FOR MORE INFORMATION ON ADVERTISED PRODUCTS

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The cards shown here are supplied for your convenience. Just ✓ ✓ ✓ check the circle with the number of the item in which you are interested, tear off the card, and drop it in the mail.

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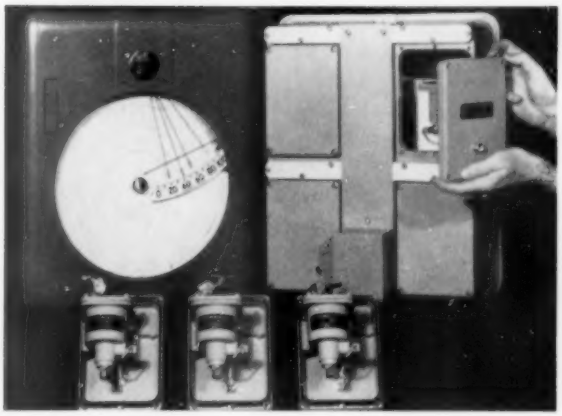
. . . What's New in Equipment?

Use the handy Time-Saver Cards ✔✔✔ to obtain additional information on these items

by Dan B. Miller



New Recorder Has Plug-In Receivers

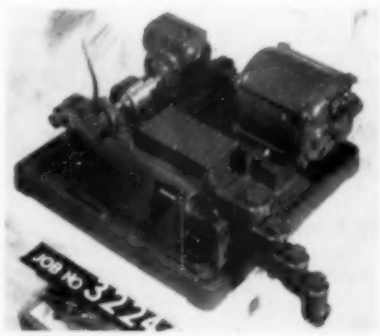
A standard recorder is available which keeps continuous, independent records of one to four pneumatic and electric transmissions in any combination. The new Bailey recorder is a receiver recorder for pneumatic and electric transmission system in power and process plants. It will record any measured variable which may be converted to pneumatic or electric signals. Receiver units may be added or interchanged, permitting easy field adaptation to new or revised metering and control applications. Two, plug-in escapement-type integrators may be included in the same casing with two flow records. Fountain-type recording pens provide continuous feed for 1 year without refilling. The new pens are stainless-steel capillary, fed from hermetically-sealed ink sacs. The recorder is designed for panel mounting. Panel bolt holes and studs are not required. Recorders are available in green, buff, grey, or black baked-enamel finish. *Bailey Meter Co.*

Check No. 1 On The Time-Saver Card

●

Flow-Control Pump Offers Accurate Proportional Feed

The new flow-control pump offers process and instrument engineers a flow-control instrument which assures accurate proportional feed with minimum use of expensive additives. This clutch-actuated, positive-displacement-type pump makes possible many new techniques for intermittent feed, resulting in lower equipment costs, simplified installation, and more dependable operation.



Operating in a proportional feed system, the solenoid trips the clutch on signal from a device used to measure the main-line flow. The clutch is then engaged to permit the pump to complete one suction-discharge cycle and return to the idling position. A mechanical latch prevents the clutch from remaining engaged in the event of signal failure which might keep the solenoid closed. Positive-displacement meters equipped with electrical contacts, differential meters, or flow meters may be used to transmit the signal in proportion to the rate of flow. *Milton Roy Co.*

Check No. 2 On The Time-Saver Card

●

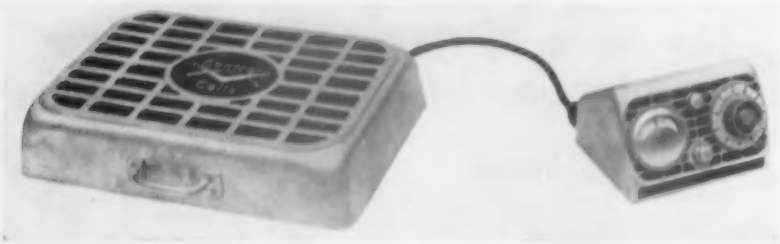
G.E. Oilwell Pump Starter Is In Gasketed Enclosure

A new oil-well pumping starter features a gasketed enclosure and ventilated overload-relay compartment. The starter enclosure is sealed with a neoprene gasket to prevent entrance of dust or rain, but at the same time, a separate ventilated overload-relay compartment helps prevent relays from tripping due to heat from the sun. An external reset button permits resetting relays without opening the sealed main-starter enclosure.

The timer on the new oil-well pumping starter is designed for programing on a 24-hour basis. Also available is a sequence restarting timer for staggering the return of wells to service after power shutoff. The program-timer door permits setting timer without exposing the operator to possible electrical shock, since the main-starter enclosure can be padlocked, leaving only the program timer accessible. Short-circuit protection is available in either circuit-breaker form, or by a fusible disconnect switch. Built for all-weather operation, the new starter has a baked-on-enamel finish over a phosphate-treated base that prevents rust from surface scratches from spreading. *General Electric Co.*

Check No. 3 On The Time-Saver Card

What's New... Use the handy Time-Saver Cards



Small Electronic Scale Weighs Big Loads

Up to 40,000 lb. can be weighed with equipment no larger than a brief case with the new portable electronic scale. The scale is described as the first practical low-cost application of electronic-weight sensing to industrial and other weighing problems. The Control Cells scale or weight indicator consists essentially of a small platform containing the electronic-weight sensing element and a separate, portable dial cabinet connected to the platform by an electrical cable. The platform weighs only 45 lb. and has a large handle for easy lifting and moving from job to job. The dial may be placed at the weighing platform or installed for remote control.

The weight-sensing element itself is a rugged, tubeless, electrical unit sealed in a steel casing slightly larger than a pack of long cigarettes. Weighing is accomplished by plugging in the scale at the nearest 110-volt outlet. Operation may be by battery. Among advantages claimed for this scale are high industrial accuracy, ease of operation, resistance to overload, and economy. The device is particularly suited for outdoor use as it is unaffected by weather or temperature. *Control Cells Corp.*

Check No. 4 On The Time-Saver Card

●

Air Pressure Lighting Is For Hazardous Areas

Absolute safety can be obtained in lighting hazardous areas. The new air-pressure explosionproof lighting fixtures and portable floodlights have the full approval of the Underwriters' Laboratories, Inc., and the Canadian Standards Association for areas listed Class I, Groups A, B, C, and D, and the fixtures, in addition, for Class II, Groups E, F, and G. They are the only units which may be used in Group A and B areas which include hydrogen, acetylene, manufactured gas, and compounds or processes of equivalent danger.

Absolute safety is achieved by the use of interior air pressure greater than surrounding hazardous atmospheres. This pressure entirely prevents the entrance into the unit of any gas, fume, vapor, or dust. It also completely eliminates breathing and seepage. These units operate under individual, self-contained air-pressure. About 11 psi. is inserted which builds to 15 psi. under temperature. If, due to some unforeseen accident, the unit is damaged and loses pressure, its switches are set to extinguish the unit at 3½ psi. This automatic safety feature eliminates any danger of explosion by damage. A relief device prevents the reinsertion of more than 25 psi. by personnel. The unit operates immediately again upon the replacement of a relief device insert. Units are delivered fully pressurized ready for mounting.

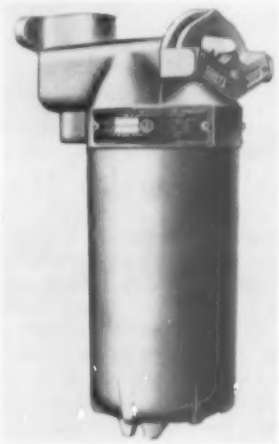
These units require no maintenance other than relamping. Relamping requires about 5 minutes' work. The lamps last 2,500 or 4,000 hours, providing over 90 per cent efficiency at the end of the life of the lamp. Air pressure is reinserted after relamping by an ordinary bicycle pump or its equivalent. Fully translucent plastic shields provide complete protection from accidental lens breakage, and permit easy frequent cleaning without dismantling. These units also have exceptionally low surface temperature which makes their use particularly pertinent in areas where fumes, gases, and residues have low auto-ignition points. For example, the 150-watt pendant fixture has a maximum surface temperature of only 68° C. *Safe Lighting, Inc.*

Check No. 5 On The Time-Saver Card

●

New Condulet Restarts Motors Automatically

A new time-delay push-button station Condulet Type OFC restarts motors automatically. The device is set to restart motors within time limits of 2, 4, or 6 seconds.

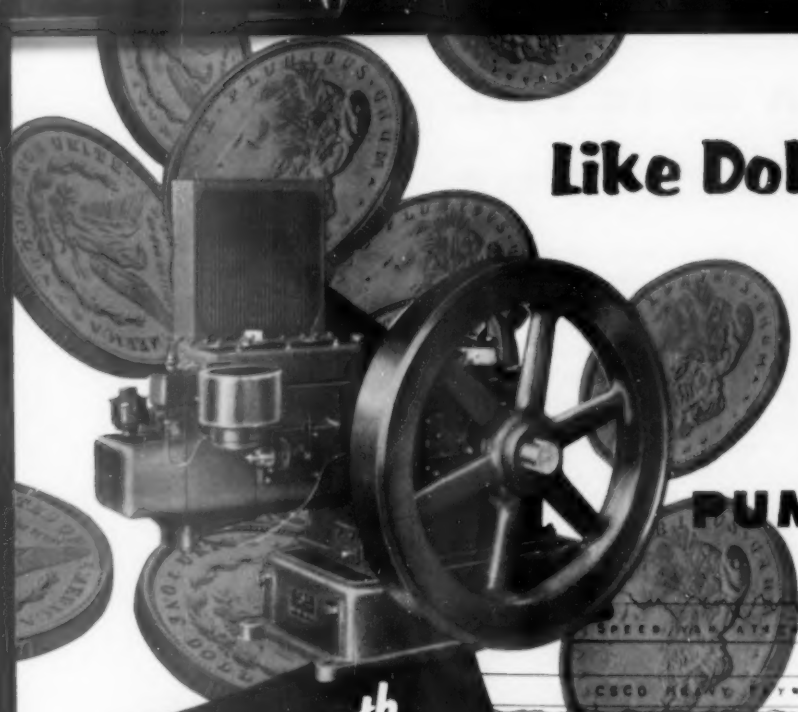


Designed for use at Class I, Group D; Class II, Groups E, F, and G; or Class III hazardous locations, the new explosionproof and dust-tight device is similar in outward appearance to standard OFC push-button station Condulets. However, its dome-shaped cover is 9½ in. deep, much longer than the standard Condulets.

Interior electrical equipment of the device includes a push-button switch, capacitor, rectifier, sensitive relay, and control relay. In addition, a transformer for voltages exceeding 110 is supplied with capacities of 220, 440, and 550 volts. All internal wiring is supplied, including two terminal blocks; one for field connections and another marked for 2, 4, and 6 seconds. By positioning one wire at any one of these terminals a time delay of 2, 4, or 6 seconds is determined.

Body of the device has vertical through-feed hubs for threaded conduit, one of which is equipped with a re-

Like Dollars in the Bank!



CSCO

PUMPING ENGINES

1 Smooth, Steady Operation

The degree of damping chosen for CSCO Pumping Engines is exactly suited to their extra heavy flywheels. They team up to produce the smoothest running engine on oil well pumping. The flywheel inertia provides the peak power while the oil pumped governor holds the throttle steady, thus permitting engine to average the power, up to its full capacity.

No need to [illegible] CSCO Engines on oil well pumping!

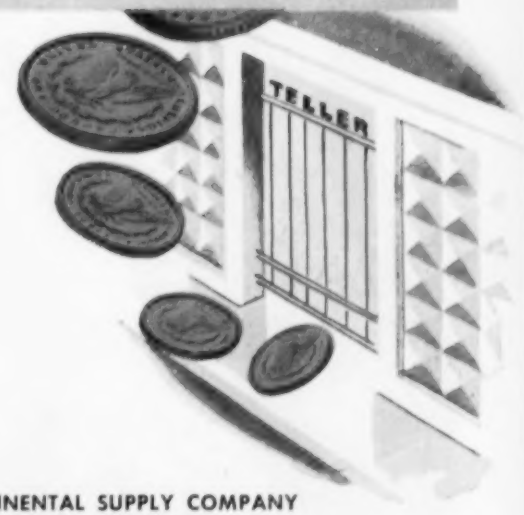
one of 4 outstanding features that make CSCO PUMPING ENGINES economical to operate:

2 EASY AND SAFE TO START
CSCO Engines were designed for oil well pumping and of top engineering importance was easy and safe starting. This is possible through exclusive CSCO features.

3 EASY TO SERVICE
There's no need to stop a CSCO to check oil level . . . to add oil . . . to check water level . . . or to add water. Less shut-down time for servicing since CSCO is engineered for easy access.

4 EASY TO REPAIR
CSCO parts needing repair or attention can be removed with a minimum of disturbance of adjacent parts or assemblies. CSCO design embodies unit assemblies . . . each accessible, quickly and easily.

Smoother, steadier performance is only one of several reasons why a CSCO Pumping Engine is more economical to operate. Easy starting; easy servicing and repairing because of easy access . . . all add up to cutting costly shut-down time to a minimum. Plus—when renewal of a CSCO is desired *all* work can be done on the location!



CSCO Pumping Engines and accessories are available through Supply Stores other than Continental.

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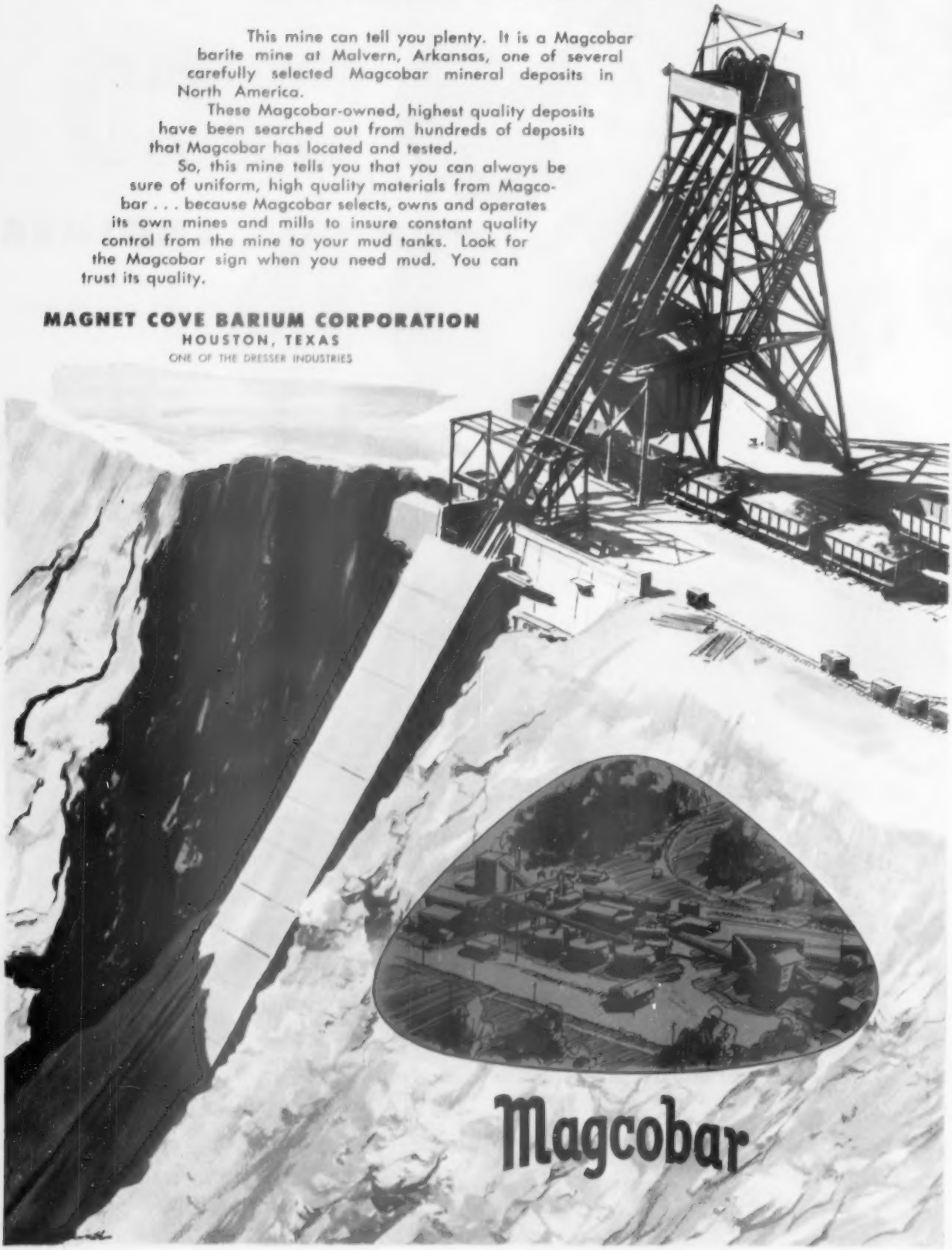
WHAT CAN A MINE TELL YOU ABOUT MUD?

This mine can tell you plenty. It is a Magcobar barite mine at Malvern, Arkansas, one of several carefully selected Magcobar mineral deposits in North America.

These Magcobar-owned, highest quality deposits have been searched out from hundreds of deposits that Magcobar has located and tested.

So, this mine tells you that you can always be sure of uniform, high quality materials from Magcobar . . . because Magcobar selects, owns and operates its own mines and mills to insure constant quality control from the mine to your mud tanks. Look for the Magcobar sign when you need mud. You can trust its quality.

MAGNET COVE BARIUM CORPORATION
HOUSTON, TEXAS
ONE OF THE DRESSER INDUSTRIES



movable pipe plug for either dead-end or through-feed wiring. Also, a shaft with a threaded bearing provides efficient movement without excessive wear of the station Condulet's operating mechanism. *Crouse-Hinds Co.*

Check No. 6 On The Time-Saver Card

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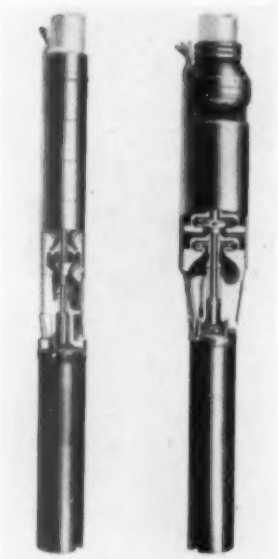

Fig. 6710—4" Fig. 6720—6"

Submersible Pumps Produce Large Volumes of Water

New submersible turbine pumps for wells 4 and 6-in. i.d. are designed to meet demands for larger volumes of water than are obtainable with conventional types of water systems. Capacities range from 600 to more than 7,000 gal. per hour. Entire pumping unit is made of corrosion-resistant materials for operating completely submerged in water. Pump never needs priming, is practically noiseless in operation, and requires a minimum of power.

Moving parts of pump are water cooled and water lubricated. No running seals are required as the motor is designed to operate in water. Windings are enclosed permanently in a stainless-steel case and the durable, waterproof cable is connected with a water-tight fitting. As the tank and control may be located away from the well, if desired, and the service line placed below ground, no pump house is required. The complete pumping unit, submerged in the well water, is protected against freezing and tampering.

The motor and turbine-type pumping unit are completely assembled at the factory, ready for placing in the well.

What's New... Use the handy Time-Saver Cards

Enclosed bronze impellers are securely keyed to stainless-steel pump shaft which is protected through the bearings with stainless-steel sleeves. Impellers are the low-thrust type, accurately positioned in each bowl or diffuser.

Fig. 6710 pumps for wells of 4-in. i.d. have all bronze turbine-type bowls with streamlined waterways. Close fitting high-lead-bronze bearings are located in each bowl. Fig. 6720 for wells of 6-in. diameter or larger have bronze diffusers to efficiently guide the water from each impeller to the next. Diffusers are accurately aligned in a heavy, tubular brass housing with bronze bearings located at proper intervals for smooth operation. *The Deming Co.*

Check No. 7 On The Time-Saver Card

●

Tong Requires One Jaw Change for Different Casing

The new deep-face casing tong Type ADF handles the lightest weight casing without danger of bottlenecking or crushing. According to the manufacturer no other tong has a full 10-in.-deep face, and no other casing tong can be changed from one size to another by changing only one jaw.

Each of the 4 die slots contains 2 tong dies, a total of 8 dies with 34 in. of die contact around the casing. Only 5 interchangeable lug jaws are needed to fit all casing sizes from 9⅝ to 17 in. o.d., and each lug jaw fits both the casing and the coupling of a given size.

It is available as a complete tong, or the Type ADF head only can be fitted to any Type AAX Web Wilson rotary tong lever and hanger. *Web Wilson Oil Tools, Inc.*

Check No. 8 On The Time-Saver Card

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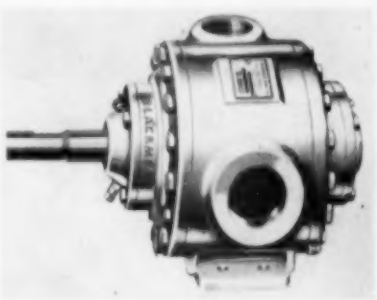


New Liquefied Gas Pump Features Mechanical Seal

A new rotary pump is especially designed for handling liquefied gases such as propane, butane, or anhydrous ammonia. The pump features antifriction bearings located at both ends of the shaft and completely isolated from the pumpage.

Cartridge-type mechanical seals are located on both sides of the rotor for controlling shaft leakage of valuable and hazardous products. This feature eliminates packing-gland maintenance and protects the bearings from the pumpage. The seals are easily replaceable as a unit.

Standard construction provides nonmetallic sliding vanes which are self-adjusting for wear. For certain liquefied gases, such as anhydrous ammonia, special composition vanes are furnished. The vane and liner construction makes these parts easily replaceable and affords low-maintenance costs. *Blackmer Pump Co.*

Check No. 9 On The Time-Saver Card

●

Lightweight Winch Weighs Only 80 lb.

The Model 5 lightweight winch is just 11-in. high and weighs 80 lb., yet is powerful enough to operate a safe working load of 6,000 lb. The new Model 5 has a high worm-gear ratio

wherever there's a leak...
the DRESSER way
is easier...surer!

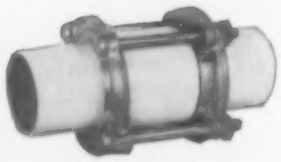
DRESSER CLAMPS

Dresser Repair Clamps enable you to stop leaks, and at the same time, *keep the contents of the line moving.* Merely put a Dresser Repair Clamp around the leaking pipe and tighten the bolts... the special Dresser Gasket offers you a permanent leak-proof seal.

Wherever there's a leak . . . you'll find a Dresser Repair Clamp is the handiest, quickest way to make a repair . . . in any weather . . . on any pipe . . . *and without shutting down the line!*

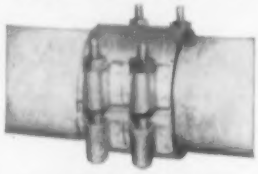
Be ready for any fast repairs by keeping Dresser Repair Clamps in stock. The four styles shown at right are just part of Dresser's complete line of repair products, available at your nearest oilfield supply store.

AVAILABLE AT LEADING OILFIELD SUPPLY STORES

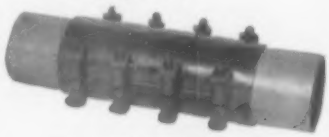


For leaks through threads of screw collars. Collar Clamps, Styles 4 and 41.

For leaks and holes in run of pipe. Band Clamp, Style 77B.



For repairing leaks in asbestos cement pipe. Hydrepair® Clamp, Style 179.



For repairing pitholes and longitudinal splits. Split Repair Clamp, Style 79B.

*HYDREPAIR is a trademark of Dresser Manufacturing Division.

DRESSER® REPAIR CLAMPS

Dresser Manufacturing Division, 49 Fisher Ave., Bradford, Pa. (One of the Dresser Industries).
Warehouses: 1121 Rothwell St., Houston, Texas; 101 S. Airport Blvd., S. San Francisco, Calif.

of 60 to 1, which permits direct drive from the source of power and eliminates the need for a worm brake.

It can be installed in any convenient location. Drive power may be provided by a small hydraulic or electric motor or power takeoff. The Model 5 is easily adaptable for any installation since it can be driven from the right or left side of the transmission without any disassembly. *Tulsa Winch, Division of Vickers, Inc.*

Check No. 10 On The Time-Saver Card

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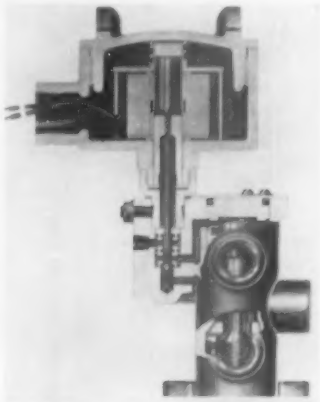


Solenoid Valve Features Extremely Short Stroke

An explosionproof solenoid air valve features extremely short solenoid stroke. Experience with standard lines show that this feature in conjunction with pilot operation eliminates the problem of coil burn out.

Poppet design with liner sealing contact on resilient seats makes both pilot and main valve self-scavenging. The effectiveness of this design has been borne out on extremely dusty installations. The cover of the explosionproof housing is removable for quick access to the solenoid. The coils are interchangeable, making it easy to convert to any standard voltage by a simple coil change. *Barksdale Valves.*

Check No. 11 On The Time-Saver Card

●

Kelite Develops New Low-Cost Detergent

Nu-D-Tergent is a new organic non-soap detergent. It is a 100 per cent active compound devoid of fillers, salts, and builders. Nu-D-Tergent dissolves rapidly in either cool or hot water and has a pH lower than toilet soap.

The new detergent removes a wide variety of soils by acid neutralization, wetting-out, solubilization, displace-

in action the world over!

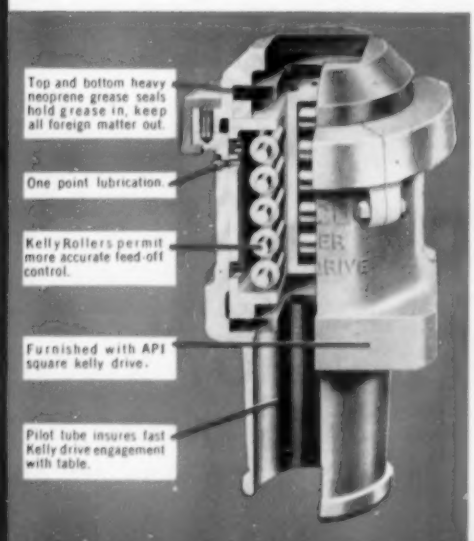
OVER 150 FULL-VIEW MASTS

OVER 300 KWIK-LIFT MASTS

OVER 200 RAMBLER RIGS

OVER 400 HYDRAIR RIGS

Ideco.. world's largest selling rotary table!..


Top and bottom heavy neoprene grease seals hold grease in, keep all foreign matter out.
One point lubrication.
Kelly Rollers permit more accurate feed-off control.
Furnished with API square kelly drive.
Pilot tube insures fast Kelly drive engagement with table.

AND AN EQUAL FAVORITE, ITS RUNNING MATE, THE IDECO

ROLLER KELLY DRIVE

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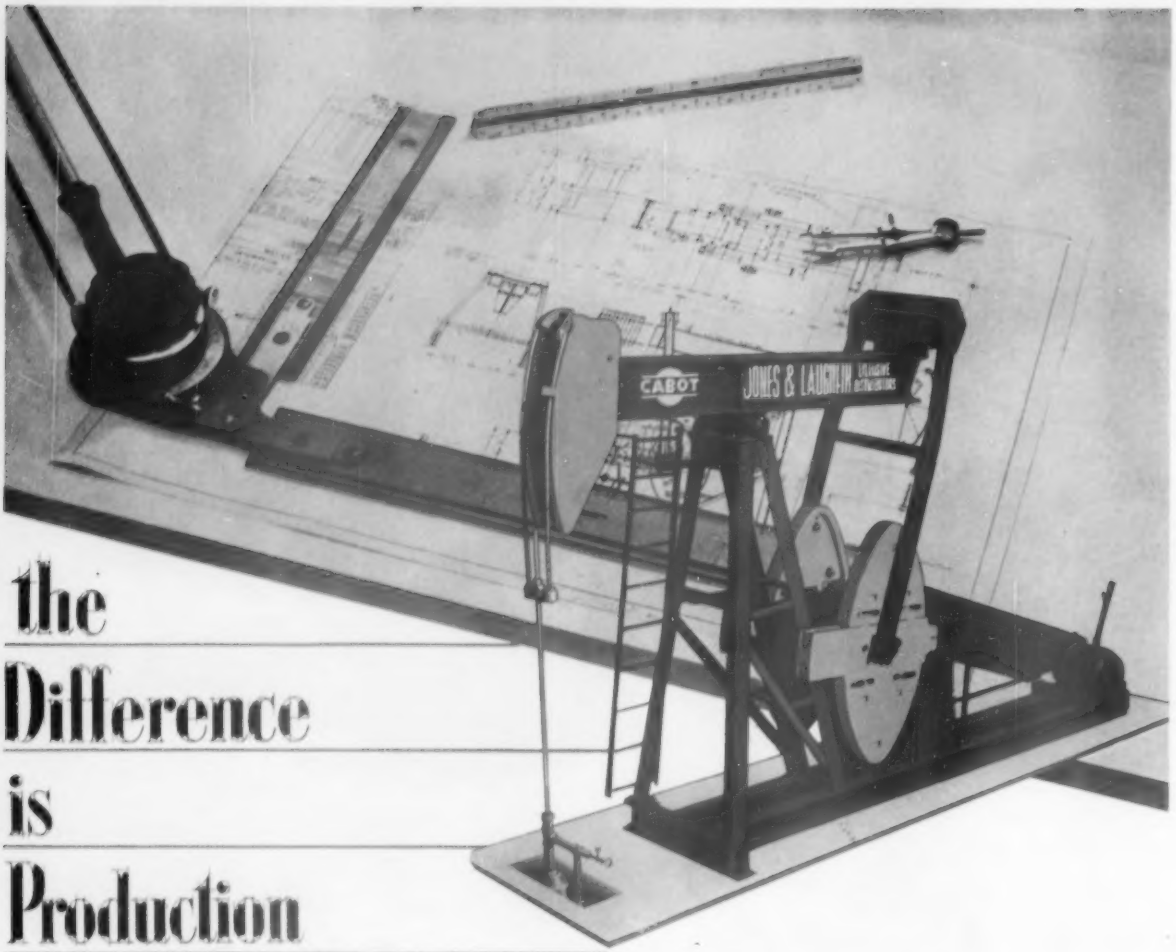
VISIT THE IDECO HOSPITALITY ROOM AT THE DRILLING CONTRACTORS' CONVENTION



the Difference is Production

Compare Cabot with other pumping units across the board . . . from drafting table to maintenance cost, from assembly line to field performance record. All the way you'll find important differences in design, in materials, in workmanship. *But the place it pays off is in the field.* Pays off with big bonuses in production . . . more oil in the pipeline. You spend less money for replacement parts, lose less production to downtime and make bigger entries in the net profit column.

Take the amazingly simple Cabot Adjustable-Crank . . . adjustments can be made by one man standing on the ground and with the cranks in one position. Single piece inner weights are easily added by lifting them into place and securing with three bolts. All Cabot reducers have automatically flood lubricated Sykes-cut herringbone gears. Oil seals on all reducer shafts have been eliminated.

Heat treated high carbon steel slow speed shafts are extra large so that deflection is reduced to a minimum. Cabot's exclusive, shock-absorbing Equalastic® Bearing eliminates the conventional shaft, bearing, evener beam, and fittings. In their place four heavy rubber bushings are vulcanized to a single alloy steel shaft. The Equalastic® Bearing requires no lubrication and is resistant to salt water, sand, grease, grit and weather. It absorbs vibration including well shock and high frequency vibration from prime movers.

On the drafting tables and in the field, Cabot unfailingly proves superior to any other pumping unit . . . and the big difference is PRODUCTION. Contact your nearby Jones and Laughlin Representative for complete information on Cabot Pumping Units.

CABOT

CABOT SHOPS, INC.

PAMPA, TEXAS

ment, and emulsification. Concentrations of less than 1 oz. to a gal. show surface tension of less than 30 dynes. Nu-D-Tergent forms a clear solution without curds in hardest water, even in saline water.

Nu-D-Tergent is suitable for cleaning concrete, asphalt, painted surfaces, and innumerable similar uses. Nu-D-Tergent contains no heat-producing free alkali, will not induce rusting of ferrous metals, and is safe on all natural and man-made fibres. *Kelite Products, Inc.*

Check No. 12 On The Time-Saver Card

●

Packaged Microwave Is For One-Hop Communication

A new commercial-packaged microwave radio station, a compact, weather-proofed metal cabinet, housing complete transmitting and receiving equipment is for (line of sight) one-hop point-to-point communication. If more than one channel is required, multiplex equipment which will provide two-voice channels with signaling can be installed inside the cabinet. Additional voice or telegraph multiplex units, installed in a similar housing, can also be connected to the radio equipment. It is particular-

Now Completely

ENCLOSED

For Easy Upkeep
Safety
Efficiency

THE NEW "STREAMLINED"

WICHTEX

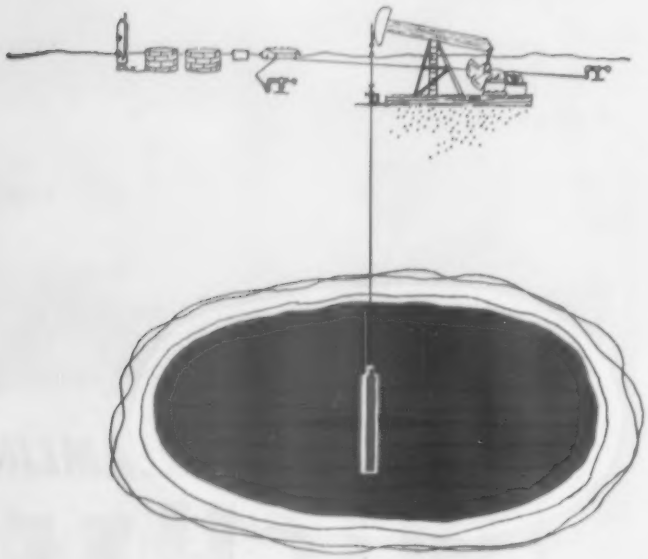
WELL SERVICING UNIT MODEL C-65

Here's the last word in trouble-free well servicing equipment—the newest Wichtex Model C-65—purchased by Ross Well Servicing Company, Nocona, Texas. It's completely enclosed, reducing cleaning problems and increasing safety and efficiency. All bearings are lubricated at two points on each side of the machine. All Wichtex units are now available completely enclosed. Models vary from 1,500 to 15,000 feet capacity. Write for catalog.

WICHTEX MACHINERY COMPANY INC.

WICHITA FALLS, TEXAS

Water Flood



One good reason for the widespread use of a Harbison-Fischer Double-Displacement Rod Pump in water flood production wells is the operating flexibility of a sucker rod actuated insert pump as compared to centrifugal or reciprocating pumps. Double-Displacement rod pumps also will handle more volume than a tubing pump.

The Double-Displacement Pump is a full insert type assembly with two plungers and barrel tubes in tandem operating with a single set of valves. It seats in a standard cup type seating nipple or the old working barrel in the tubing, and operates like any other conventional insert pump. Double-Displacement Pumps are available in bottom hold-down types in 2" x 1½", 2½" x 2", 3" x 2½" and 4" x 3¼" sizes with these bore constants: 1½"–.408; 2"–.762; 2½"–1.194; 3¼"–1.892. (To calculate production for 24 hrs., multiply S/Min. x length of stroke x constant.)

Double-Displacement Pumps with H-F Flexite Ring Plungers are recommended for wells making water, but Tuff-Temper, Precision, and H-F Composition Ring Plunger assemblies are also available for various well conditions.

Double-Displacement Pumps are in successful operation in various fields throughout the mid-continent area, including many water flood projects. Leading stores will be glad to give you additional information, or write to us for an illustrated bulletin and comparative field test data. Harbison-Fischer Mfg. Co., P. O. Box 127, Fort Worth, Texas. Factory representatives throughout the oil country.

HARBISON-FISCHER

WILSON Double-Displacement PAT. PEND.

ROD PUMP

ly designed for the economical requirements of such circuit operations as remote VHF control, voice communication, facsimile, telegraph, telemetering, and supervisory control applications. *Radio Corp. of America.*

Check No. 13 On The Time-Saver Card

●

Flexible Couplings Provide Tight Seal

New flexible steel couplings for large diameter pipelines, 24 to 96 in., have application in water, gas, and oil lines. Because they are easy to install; they provide a bottle-tight seal and yet, are flexible enough to allow for expansion, contraction, and misalignment.

Special expansion jointing is not required on a pipeline when these couplings are used on all joints. Welding is completely eliminated and only a wrench is required to couple a string of pipe. AllSteel couplings consist of a formed middle ring, two rubber gaskets, two follower-flange rings, and heavy bolts. Two types of gaskets are available, Lastite rubber and Lastite Neoprene. Middle rings are made in various thicknesses and lengths. *R. H. Baker & Co.*

Check No. 14 On The Time-Saver Card

●

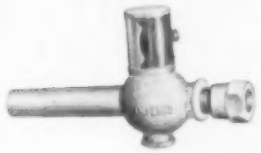
New Reodorants Improve Odor of Fuel Oil

Alamask 0.19 and Alamask 0.20 are designed for use in the petroleum industry to improve the odor of fuel oil. The new reodorants provide adequate odor coverage for both No. 1 and No. 2 fuel oils. A concentration of 0.006 per cent for the No. 1 fuel oil and 0.0085 per cent for the No. 2 is recommended.

The Alamask products available to petroleum refineries provide a selected line suitable for reodorization of lubricants, mineral spirits, naphthas, asphalt compounds, diesel fractions, and gasoline stocks. *Rhodia, Inc.*

Check No. 15 On The Time-Saver Card

INFERNO
Oil Burner



Saves Money!

The Inferno Oil Burner shows savings as high as 33% on oil consumption, and boiler repairs are reduced to a minimum. Much less steam is required to operate this burner because the necessary steam used to atomize the oil is supplemented by the blast of primary air through the valve. Write for Bulletin No. 24.

THE INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.
INFERNO

Telephones:
HOUSTON
UN-1253
MA-5557 MI-9-0747 OX-2-5135
MO-5-6809 TW-1397 OL-1589

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TIME TESTED
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2-7637
ZF-78424

LAFAYETTE, LA.
8-9851
5-4479
4-2477

They're NEW

- Bulletins
- Catalogs
- Brochures

for your copy, check ✓ ✓ the Time-Saver Cards.

Cementing Surface Casing is a four-page reprint from a magazine article authored by Bruce Barkis. Text and illustrations describe the hazards to guard against in cementing surface casing, and outlines proper cementing procedures. *B. & W, Inc.*

Check No. 16 On The Time-Saver Card

●

Phillips 66 Hydrocarbons Catalog. In addition to an index of products this 100-page, spiral-bound catalog contains such information as specifications, components, properties, containers recommended, and shipping notes on paraffins, cycloparaffins, olefins, cycloolefins, diolefins, aromatics, and other special purpose hydrocarbons. *Phillips Petroleum Co.*

Check No. 17 On The Time-Saver Card

●

A Method of Maximum Oil-Well Pumping. The equipment and a method of producing an oil well by controlled injection of power gas into a pump chamber, is illustrated by use of schematic drawings showing both the loading and the ejection cycles. Complete details of how it works compliment the drawings. *T. & C. Pump Co.*

Check No. 18 On The Time-Saver Card

●

Steel Barrels. This illustrated brochure lists capacity, weight, dimensions, sheet thickness, and hoop styles on rolling-hoop barrels, steel barrels for sulfuric acid, welded-beading barrels, seam-beading barrels, barrels internally lined with tin, bulged barrels, hop drums, and transport cans. *Mannesmann-Export G.m.b.H.*

Check No. 19 On The Time-Saver Card

●

Engineering Handbook for Multi-V-Drives. A 76-page illustrated multi-V-belt engineering handbook features a convenient guide to the design of standard and high-capacity drives. New horsepower rating tables closely approximate actual operating conditions

There is no safer, longer lasting chain than

CAMPBELL

- Spinning Chains
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TIRE CHAINS

and reflect the increased ability of modern belts. The horsepower tables permit the design or redesign of V-belt drives at lower cost by reducing the number of belts needed to carry a given load and indicating the potential use of lower-cost sheaves. The tables cover speed ratings from 100 to 6,000 ft. per minute. *The B. F. Goodrich Co.*

Check No. 20 On The Time-Saver Card

●

Radiation Instruments for Locating Metals, a 12-page, multicolor brochure, offers extensive data and illustrates a line of radiation instruments for locating metal, metal ores, and uranium. Accessory equipment for these instruments is also listed. *Precision Radiation Instruments, Inc.*

Check No. 21 On The Time-Saver Card

●

New Cathodic Protection Booklet. This attractive 12-page Catalog Section S-6500 is a complete reference work on the mitigation of corrosion of underground and submerged metal structures by the application of an impressed-current cathodic-protection system using graphite anodes. Slanted toward both the management executive and the engineer, the booklet contains valuable information on the cost of corrosion; the economics of cathodic protection; where and when it can and should be applied; facts about impressed-current systems and how they should be installed; typical ground-bed-installation details including design notes and tabulation of material requirements. *National Carbon Co.*

Check No. 22 On The Time-Saver Card

●

Complete Drilling Mud Service Catalog 1954-1955. Printed on heavy glossy stock, this 42-page catalog carries full-color illustrations, descriptive information, and data tables on basic drilling muds, chemicals for drilling muds, emulsion muds, and lost-circulation materials. Of particular interest is an engineering data section covering most of basic engineering data on drilling mud and additives. Another section of the catalog describes mud-testing instruments and kits. *Magnet Cove Barium Corp.*

Check No. 23 On The Time-Saver Card

●

Controlled Friction is an eight-page brochure outlining the principle which eliminates dangerous pipe bottlenecking. Users can safely hang any weight of pipe in the world's deepest wells economically, dependably, and quickly in casing hangers equipped with controlled-friction slips. *McEvoy Co.*

Check No. 24 On The Time-Saver Card

●

Ball Bearing Swivel Fittings. This engineering handbook describes 8 basic styles and over 500 models of ball-bearing swivel fittings. The principle of a ball bearing rolling on a flat surface is featured. These swivel fittings are designed with large fluid passageways and smooth contour of bends to reduce turbulence and increase flow. *Emsco Manufacturing Co.*

Check No. 25 On The Time-Saver Card

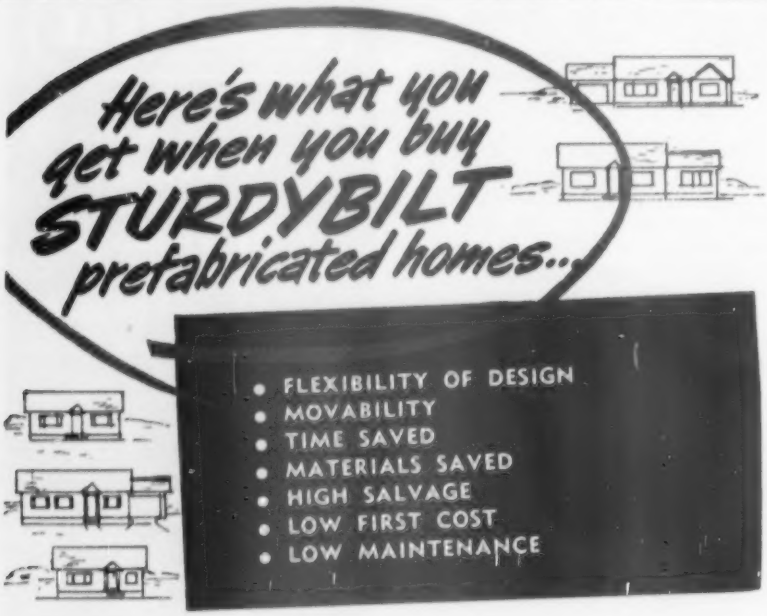
●

Tubing Leaks Show Up Under Pressure With Hydro-Test features a three-color schematic drawing of Hydro-Test equipment installed in a stand of tubing. Text describes the operation sequence and an explanation of the retrievable-plug method. *Hydro-Test, Inc.*

Check No. 26 On The Time-Saver Card

●

Minimax Fire Extinguishers. This booklet, prepared in German by a German manufacturer, covers a line of industrial fire-fighting equipment. Primary equip-


Here's what you get when you buy STURDYBILT prefabricated homes...
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ATTAPULGUS Fullers Earth

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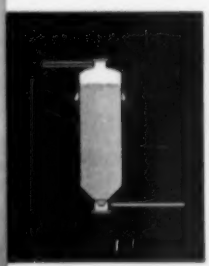
...reliable sorptive minerals for petroleum and chemical processing



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There's an Attapulgus or Porocel adsorbent to fit your process technique for removing odors, colors, tastes, moisture, acids, sulfur, fluorides and unsaturates from process liquids or gases. Materials treated in principal applications are: motor oils and other lubricating, specialty, and technical oils; petrolatums and waxes; aviation and motor gasoline stocks; kerosene; diesel and heating oils; chemicals and petrochemicals.

HAVE CATALYST OR CATALYST CARRIER NEEDS?

Our sorptive minerals are recognized standards in desulfurization, reforming and isomerization systems—catalytic removal of unsaturates—conversion of sulfides to elemental sulfur—fluid catalyst applications—as catalyst carrier in copper sweetening processes.

WHAT DO YOU WANT TO DRY?

We offer a wide range of reliable, thoroughly proved desiccants for drying air, hydrogen, carbon dioxide, hydrocarbon liquids and gases.

SPECIAL GRADES

Mine and plant facilities permit prompt and economical production of grades meeting individual customer specifications. Our laboratories and technical staffs are ready to assist in research, development, design and operating problems. Your inquiries are invited.

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WHY IT PAYS TO BUY MX SCREW STOCK FROM US

You get reduced production costs—quick delivery

● Hundreds of shop cases have shown that USS "MX" free-machining bar stock cuts unit costs considerably . . . an average of 10% to 15%, sometimes as high as 42%. And the more machine work your parts require, the greater the savings.

Here's how you cut costs when you use "MX" rather than other free-machining grades:

You get more parts per hour, longer tool life with less down time for grinding and adjustment, fewer rejects, closer tolerances and better part finish.

One of our qualified sales representatives will gladly discuss the advantages of "MX" with you as they apply to your particular shop requirements. And you can always depend upon quick delivery from the nearest U.S. Steel Supply warehouse.

In addition to "MX" stock, we carry: cold finished rounds, squares, hexagons, flats and precision shafting in all grades.

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UNITED STATES STEEL

ment includes air-foam, chemical-foam, carbonic-acid, and dry-powder extinguishers. A number of these extinguishers are particularly recommended for hydrocarbon fires. *Minimax A.G.*

Check No. 27 On The Time-Saver Card

●

Increased Feed Capacity of Vacuum Tower. A detailed case study shows how the installation of stainless-steel wire-mesh sections in two vacuum asphalt towers at Marcus Hook, Pa., a refinery of Sinclair Refining Co., increased feed capacity 30 to 35 per cent while maintaining gas-oil quality. Included in the account is a complete description of vacuum-tower operation, a table of operating conditions, and a comparison of operations before and after the demister installation. Also contained is a diagram of the vacuum towers indicating the position of the wire-mesh filter and the relative positions of the internal elements. *Otto H. York Co.*

Check No. 28 On The Time-Saver Card

●

Free-Water Knockouts. A low-pressure, horizontal, free-water knockout, Model HLK is covered in Catalog 31-12. The unit provides a closed-type water disposal for atmospheric or pressure-treating systems. It separates free water from oil and gas, or can be adapted to separate all three. The catalog includes complete descriptions of the equipment, applications, cutaway flow diagrams, operating information, sizes, capacities, and dimensions. *Black, Sivalls & Bryson, Inc.*

Check No. 29 On The Time-Saver Card

●

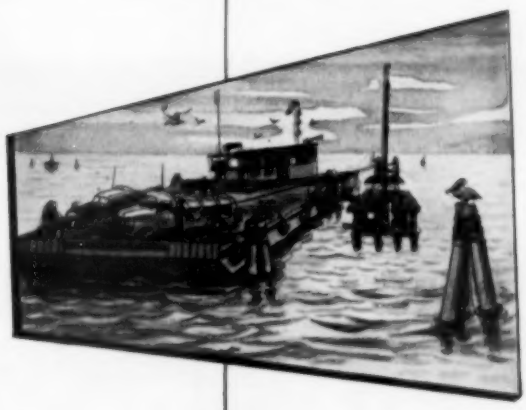
Radioactive Survey Locates Channel. A new data sheet outlines the problem of locating a channel believed to exist behind the liner or casing in an oil well. The well had not responded to conventional acid treatment. A channel determination survey was run and the channel was accurately located, enabling the operator to plug off the channel. *Dowell Incorporated.*

Check No. 30 On The Time-Saver Card

●

E-80 Sensater. Bulletin P-10 features the E-80 Sensater, the new friction-free diaphragm-type pressure transformer for ideal wire-line anchors. This colorful brochure pictures the Types D and E weight indicators and shows how the new Sensater enhances the accuracy and efficiency of these drilling-control instruments. *Martin-Decker Corp.*

Check No. 31 On The Time-Saver Card



Permanent Completions
Save Drilling Rig Time,
Allow Quick and Low-Cost
Testing of Multiple Sands
Reduce Workover Time
and Costs, Provide
Safer Operations, and
Make a Better Producer—

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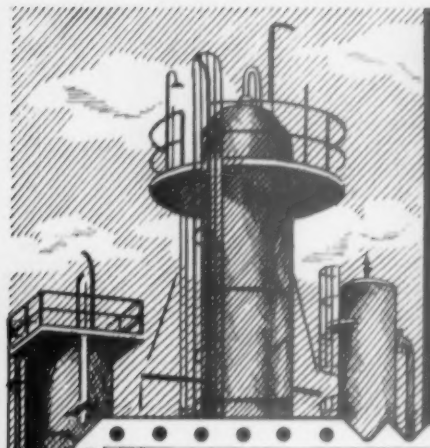


INCREASE throughput capacity
ELIMINATE costly liquid loss
IMPROVE overhead product quality
REDUCE harmful air pollution
with

YORKMESH DeMISTERS

CASE STUDY
No. 1006

COMPRESSOR MAINTENANCE CUT WITH MONEL DEMISTERS

OBJECTIVE:

To stop excessive maintenance shutdowns of compressors on a catalytic cracking unit.

PROBLEM:

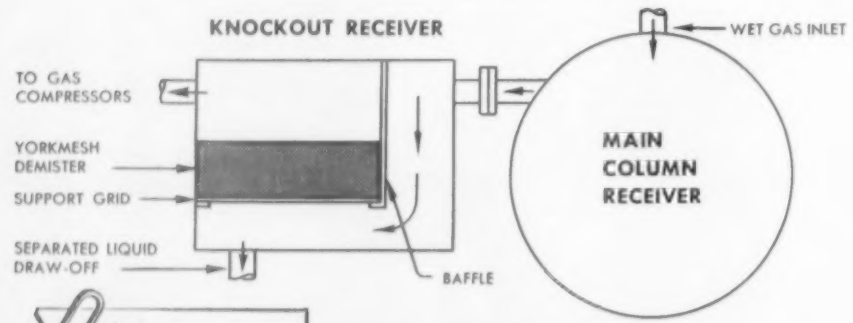
Heavy gasoline carried into the compressors diluted the lube oil and coated valve surfaces with a soft coke-like material. Valve life was thirty days or less.

SOLUTION:

A 12" thick monel demister mounted on a monel light weight grid was installed in a knock-out box in the compressor suction line.

RESULTS:

Since the installation of this demister pad the compressors have run more than a year without extra maintenance.



Note: For the full story of how monel demisters cut compressor maintenance write for case study #1006.

YORK

OTTO H. YORK CO., INC.
6 CENTRAL AVE. • WEST ORANGE, N. J.

EQUIPMENT MEN . . . in the News

Gorman-Rupp Executives Visit Henry H. Paris

Inspecting the Gorman-Rupp pumps above are, left to right: Cadigan, Francis, Mrs. Ryan, Erbe, Paris, Gorman, and Hiett.

Representatives of The Gorman-Rupp Co. recently visited Henry H. Paris Distributor, Inc., exclusive oil-industry distributor of Gorman-Rupp pumps in the Mid-Continent and Gulf Coast areas.

From Mansfield, Ohio, representing Gorman-Rupp were James C. Gorman III, treasurer; Kenneth H. Cadigan, vice president in charge of sales, and R. Gilmore Hiett, advertising and sales-promotion manager; from Houston was George Erbe, Gorman-Rupp district representative. Henry H. Paris Distributor personnel included Henry H. Paris, president; Mrs. Alberta Ryan, executive vice president and treasurer; and W. L. (Lee) Francis, all of Houston.

The Paris organization, with its headquarters in Houston, has been serving in the oil industry for more than 25 years. They have been distributing Gorman-Rupp pumps for the past 5 years and maintain complete stocks of pumps and parts in the Houston warehouses.

The visit of the factory group was highlighted by a series of planning meetings and oil-field inspections. Gorman-Rupp pumps, self-priming and conventional centrifugals, are used for regular and emergency dewatering, transfer, washdown, and mud service in the oil field.

Falcon Appoints Three Oil-Country Dealers

Falcon Products, of Pomona, Calif., has announced the appointment of three dealers in different producing areas.

Gene Buckner, Corpus Christi, Tex., will service the Southwest Texas area. In the southern Louisiana-Mississippi territory, John R. Deaver and Dudley Spiller, New Iberia, La., will handle the complete Falcon line.

Northern Well Equipment Co., Williston, N. D., with its warehouse at Tioga, N. D., will represent Falcon in Williston basin. Walt A. Minor is general manager of Northern, and Douglas McGuffin is warehouse manager.

Failing Names Carley As Chief Engineer

E. P. CARLEY

The appointment of Everett P. Carley to the position of chief engineer for George E. Failing Co., of Enid, Okla., manufacturer of portable drilling rigs, has been announced. Failing's former chief engineer, E. L. (Pete) Alexander, has been made a director of the company with administrative supervision over the production and engineering departments.

Carley was graduated from Oklahoma A. & M. College with a B.S. degree in engineering. He has been with Failing Co. for 14 years, having formerly been associated with Shell Oil Co. and Magnolia Petroleum Co.

Dallas Banks Plan Merger And Increased Capital

Plans for a merger of National City Bank of Dallas with Republic National Bank, along with an increase in Republic's capital and surplus from $50,-

Ladish Emergency Ships Fittings By Air

Urgently needed pipe fittings are shown being loaded into a giant DC-6 cargo plane to be rushed by air to Creole Petroleum Corp. in Venezuela, South America. The shipment consisted of 10 30-in. 3-R welding elbows each weighing over 2,600 lb. The special pipe fittings were produced by Ladish Co., Cudahy, Wis., manufacturer of pipe fittings, to meet an emergency requirement of Tellepson Construction Co., of Houston.

000,000 to $60,000,000 have been announced.

The announcement was made jointly in a statement by Karl Hoblitzelle, chairman of the board, and Fred F. Florence, president, of Republic, and by R. R. Gilbert, chairman, and DeWitt T. Ray, president, of National City.

Boards of directors of both banks have approved the proposals, which will be formally submitted to the Comptroller of Currency of the United States for approval.

Upon approval of the comptroller, final action will be subject to approval and ratification by boards of directors and stockholders of both institutions.

Mid-Continent Boosts Brown to Representative

R. P. BROWN

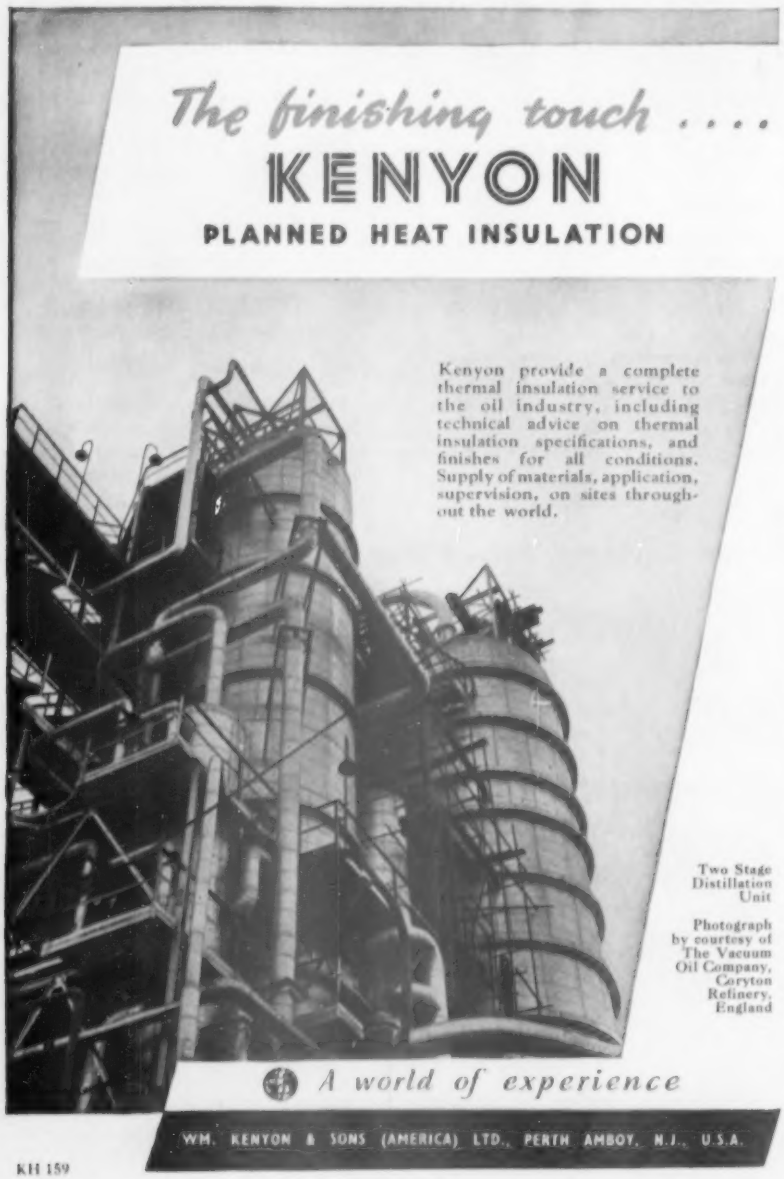
R. P. Brown has been promoted from store manager of Mid-Continent Supply Co. Bowie, Tex., store to sales representative of the organization's Wichita, Kans., district, as recently announced by Ken W. Davis, company's president.

Brown went to work with Mid-Continent in 1949 at Magnolia, Ark., store. Later, he was promoted to field salesman and store manager at Magnolia. He was transferred to Bowie as store manager in April of this year.

West Coast Ad Agency Occupies Own Building

Doubling the size of its quarters, Darwin H. Clark Co., Los Angeles advertising agency, has moved to its own building. The new two-story structure has a frontage of 108 ft. and ample parking in the rear. It incorporates modern facilities for advertising service to its clients which include industrial, scientific, consumer, and financial organizations.

As exclusive Los Angeles member of Trans-America Advertising Agency Network, the agency has associate offices in 18 principal marketing centers in the United States. Key agency personnel includes Darwin H. Clark, manager; M. L. Gowans, assistant manager; Karl Lott, Jr., and Dent Dowler, account executives.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KH 159

Continental Supply Names Two to Key Positions

G. W. BIGHAM

R. F. GREGG

Guy W. Bigham has been appointed as manager, used equipment division for The Continental Supply Co. with headquarters in Dallas. Also, R. F. (Bob) Gregg has been named division manager, tubular sales for the Arkansas, North Louisiana, Mississippi, and East Texas division.

Bigham had been division sales representative for the Arkansas, North Louisiana, Mississippi, and East Texas division in Shreveport, La., since 1948. Since joining Continental 31 years ago his other positions have included store manager at both Shreveport and Rodessa, La. Bigham, who has had extensive oil-country sales experience, will now be in charge of the sale of used equipment for Continental.

For the past 2 years Gregg has been located in Houston where he was district manager, South Central Texas district. In his new position he will headquarter in the Shreveport, La., division office. Gregg has been with Continental for the past 15 years. His other posi-

Do You KNOW

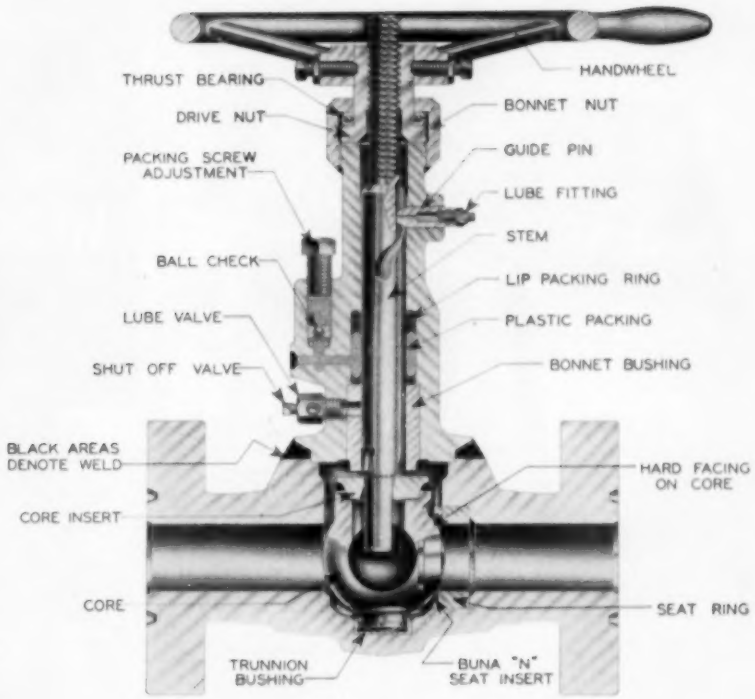
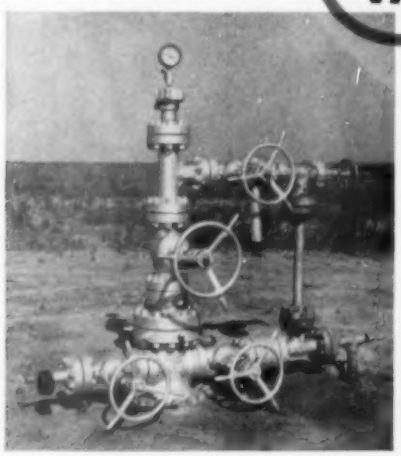


Figure No. F206-15 2" API Series 1500, Ring Joint, 3000 lbs. W.O.G. 6000 lbs. Test Pressure

ORBIT FORGED STEEL PRODUCTION VALVES offer absolute seating. There is no distortion of metal to obtain a closure. **ORBIT'S** yielding body seat always resists further compression of seating segment by pushing back to insure positive closure. Friction between the seating surfaces has been eliminated because of free movement of these parts. Contact of major seating surfaces obtained by "rolling" action of seating core into body seat.

ORBIT VALVES ®



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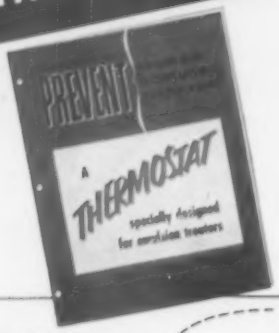
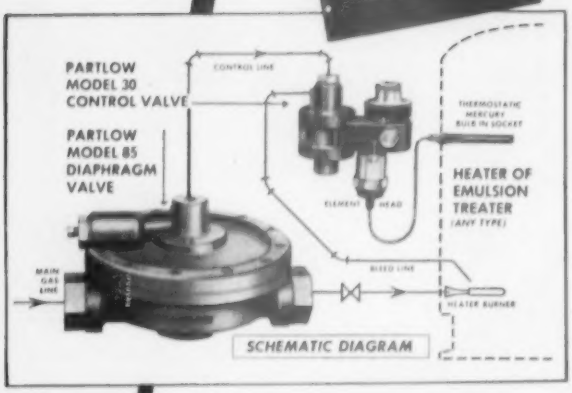
Get the surprising facts on this money-saving PARTLOW THERMOSTAT





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tions with Continental include: field salesman at Odessa, Tex. and Hobbs, N. M.; store manager, Snyder, Tex.; city salesman, Midland, Tex.; and tubular salesman, Houston.

Houston Equipment Firm Names Two Representatives

Albert I. Tatkin has been named California representative for Oil Metering & Processing Equipment Corp., of

A. I. TATKIN

J. B. LELAND

Houston, and John B. Leland has been appointed company's representative in the Rocky Mountain area, with headquarters in Wheat Ridge, Colo.

Tatkin holds the B.S. degree in petroleum engineering from University of Minnesota, school of mines, and has been actively engaged in the oil-exploration and production industry since 1941. He will provide sales and service for all of the company's products in the Pacific Coast area. His headquarters will be in Long Beach, Calif.

Leland entered the oil industry in 1925, and served with major producers in the drilling and producing departments. Later he entered the oil-field-equipment business and has since represented major manufacturers in the Rocky Mountain areas.

Announcement of these appointments was made by H. Vernon Smith, president of Oil Metering & Processing Equipment Corp.

Lane-Wells Opens Truck Station at Pratt, Kans.

To serve oil-field customers in the Kansas area better, Lane-Wells Co. has opened a new truck station at Pratt, Kans. Jack Gray, formerly radioactivity operator, has been appointed station superintendent. This brings total number of Lane-Wells branches in the United States, Canada, and Venezuela to 98.

Jimmy L. Baker, formerly subdistrict superintendent at Russell, Kans., has been named district sales engineer at Duncan, Okla. Glenn E. Cooper, formerly station superintendent at Stockton, Kans., has been appointed subdistrict superintendent at Russell. Jennings B. Thompson, formerly radioactivity operator at Russell, has been appointed station superintendent at Stockton.

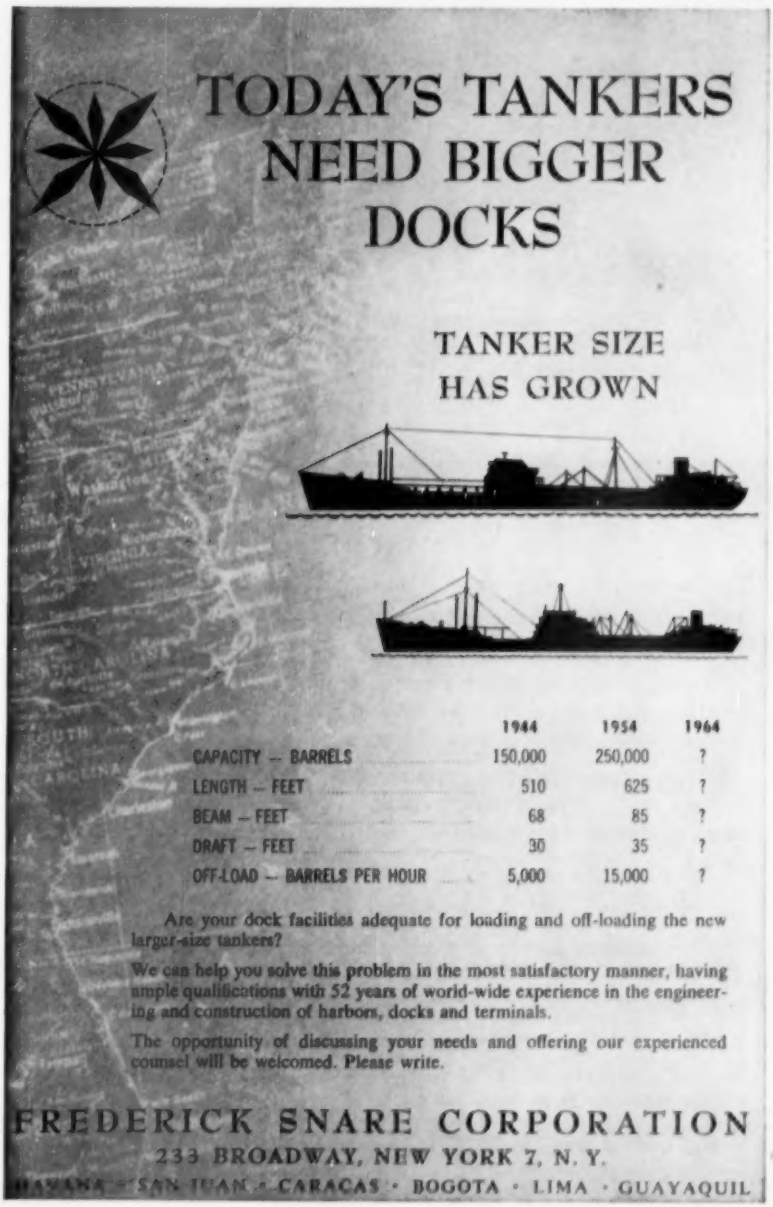
Wheatley Supply Made Marquette Pump Distributor

Frank Wheatley Supply Co., Tulsa, a new supply company specializing in oil-field supplies and equipment, has been appointed exclusive distributor for Marquette rotary pumps in the Mid-Continent area. Territory includes the states of Kansas, Oklahoma, Texas, Arkansas, Louisiana, and Mississippi.

Concurrently, Marquette Metal Products announced the appointment of Lloyd Gray, Bartlesville, Okla., as Marquette representative for the Mid-Continent area. Gray is a former representative of Frank Wheatley Supply Co.

Neyrpic-Afrique to Sell Ideco Equipment in Africa

G. W. (Jack) Walton, vice president of Ideco, one of the Dresser Industries, has announced the appointment of Neyrpic-Afrique of Algiers, Algeria, as a distributor and repair depot for Ideco oil-field drilling, workover, and servicing equipment, as well as other Ideco exclusive petroleum equipment and


TODAY'S TANKERS NEED BIGGER DOCKS
TANKER SIZE HAS GROWN
1944 1954 1964
CAPACITY — BARRELS 150,000 250,000 ?
LENGTH — FEET 510 625 ?
BEAM — FEET 68 85 ?
DRAFT — FEET 30 35 ?
OFF-LOAD — BARRELS PER HOUR 5,000 15,000 ?
Are your dock facilities adequate for loading and off-loading the new larger-size tankers?
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Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	14" to 18" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	20" to 30" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION Los Angeles, Oakland, Seattle, Portland, Denver, Tulsa, New York

supplies. The new agent will serve the North Africa area including Algeria, Morocco, and Tunisia.

Maintenance, repair work, replacement parts, and technical service will be provided by Neyrpic-Afrique through its major manufacturing plant facilities at Algiers, and branches at Rabat, Morocco, and Tunis, Tunisia. Neyrpic-Afrique is an affiliate of Neyrpic-Grenoble, manufacturer of hydro-electric turbines and other large machinery.

Oilwell Appoints Redick As Wichita Representative

H. R. REDICK

The appointment of Hobert R. Redick as city representative at Wichita, Kans., for U. S. Steel's Oil Well Supply Division has been announced by Mark Barkhurst, manager of Oilwell's Mid-Continent area.

Redick was employed by Oilwell at Russell, Kans., in 1947 and has served as field representative for the division at El Dorado, Kans.; Wewoka, Okla.; and Arkansas City, Kans. Prior to his employment with Oilwell, Redick had 3 years' oil-field experience.

Oden Becomes Partner in Texas Tool & Machine Co.

A. C. ODEN

A. C. Oden has become a partner and vice president of Texas Tool & Machine Co., according to William G. Baker, owner.

Oden is well known in the valve business, and has just completed 10 years of service with McEvoy Co. as sales engineer.

Lockey Joins Sales Staff Of Haynes Equipment Co.

Edward B. Lockey has joined the sales department of Haynes Equipment Co., Shreveport, La., according to W. M. Haynes.

In his new position, Lockey will be in charge of the oil-field sales division, and will concentrate his efforts on servicing the drilling and production supply requirements of the Ark-La-Tex area.

Lockey has been purchasing agent for Southwest Natural Gas Co., Shreveport, since 1946.

Williams Makes Sales Organization Changes

A. W. MARTIN

DALE BETHKE

Allan W. Martin has been made company sales representative in Oklahoma, Arkansas, and Louisiana for J. H. Williams & Co., Buffalo, N. Y., manufacturer of industrial wrenches, tools, and drop forgings. These states were formerly covered by Dale Bethke who has been assigned the Michigan territory.

For the past several years, Martin has been in Williams sales department at Buffalo, where he most recently handled liaison matters between sales and factory.

Bethke will make his headquarters in the Detroit area. Bethke will work with Williams distributors and their customers throughout the State of Michigan.

Announcing the NEW . . .

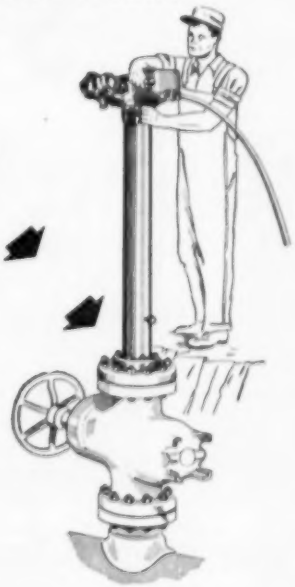
WmSON-HILLCO MODEL 660 TAPPING MACHINE*

ASA 600# RING JOINT FLANGE PERMITS PRESSURES TO 1,440 P.S.I. @ 100° F. TEMPERATURES TO 700° F. @ 700 P.S.I.

FOR MAKING CONNECTIONS TO PIPELINES AND TANKS WITHOUT SHUTDOWN OR DRAINAGE

★ 42" TRAVEL LENGTH OF BORING BAR permits . . .
PIPE TAPS TO 14" SIZE
TANK TAPS TO 16" SIZE

★ CHOICE OF POWER compact air motor or complete hydraulic drive (including engine driven pump) provides dependable lower cost power.



* Patent No's. 2,679,173—2,097,398
Write for bulletin number A-702 on your company letterhead

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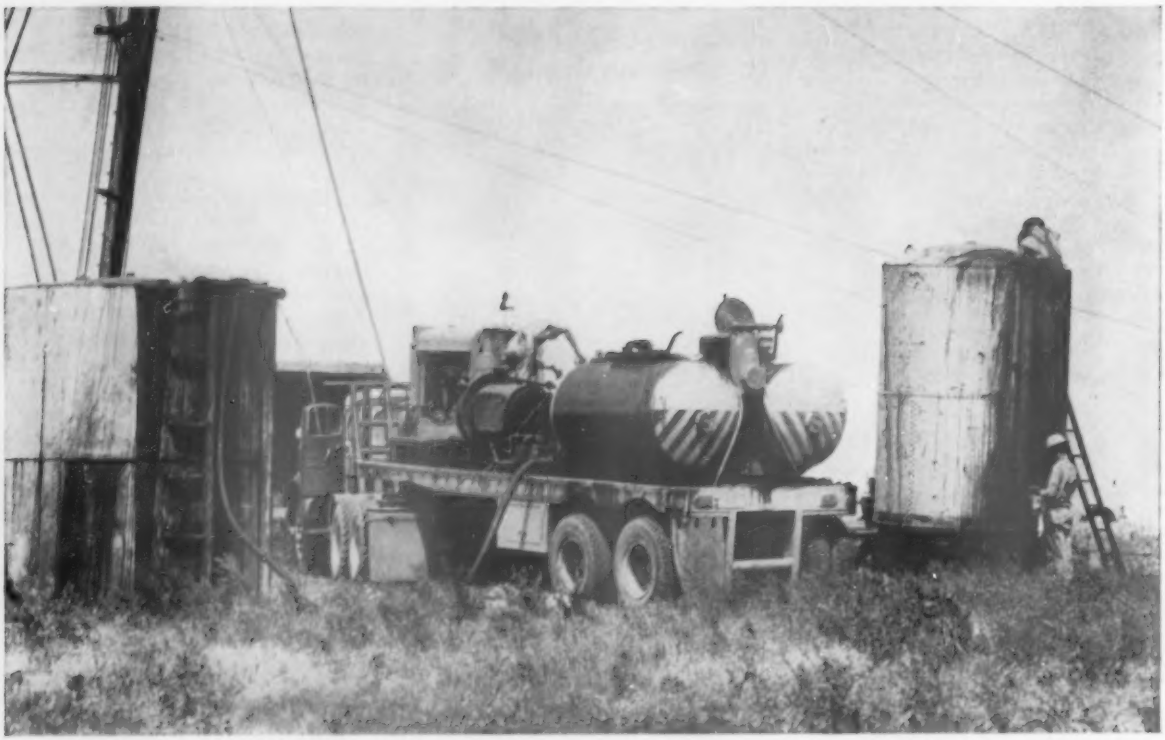


STRATAFRAC

EXCLUSIVE DOWELL SERVICE COMBINES

Case histories show production increases from wells completed in many kinds of formations

Stratafrac* is an exclusive Dowell service that fractures and acidizes formations in one operation. It is designed to extend existing fractures and create new ones.

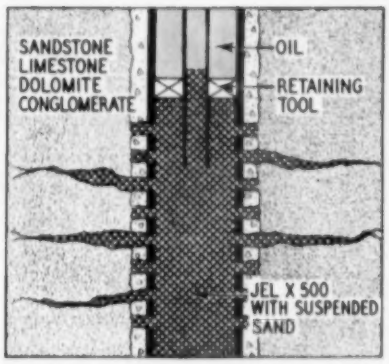
These case histories are a few examples from thousands of jobs where Stratafrac treatments increased production. A well completed in a sand formation jumped from 48 to 624 BOPD. Production from a well in a chat was increased from 1 to 264 BOPD. Production was raised from a show to 210 BOPD from a dolomite pay. And a gas well went from 4,000 MCF to 53,500 MCF.

Stratafrac has proved to be an efficient method of increasing production from sandstone, chat, conglomerate, limestone and dolomite formations not adaptable to conventional acidizing.

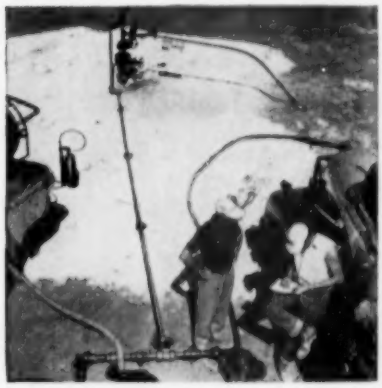
In Stratafrac treatments, a mixture of sand and Jel X 500 (a vis-

DOWELL SERVICE

Especially designed Dowell trucks are used to transport the sand-carrying gel used in Stratafrac treatments. The heavy-duty pumps are designed for high-pressure, high-volume injection. Such equipment has helped Dowell engineers perform thousands of fracturing treatments with profitable results for oil operators.



Specify Stratafrac—to dissolve soluble materials in formations . . . to enlarge old fractures and open new ones . . . to carry sand into fractures as an abrading agent.



Stratafrac requires no work-over rig. High-pressure lines are hooked directly from pump truck into tubing at well head by experienced Dowell engineers.

ACIDIZING AND FRACTURING

cous, acid-kerosene gel) is pumped into producing formations to create lenses of artificial permeability. The acid concentration and the size and amount of sand employed in Stratafrac can be varied to fit formation characteristics. A recent trend in fracturing has been the development of batch treatments—a fine grain sand followed by a coarse grain sand.** Dowell's complete control of all phases of this operation assists in the creation of larger ultimate fractures, giving better fluid drainage.

For complete information on Stratafrac, and the many other Dowell services developed for the oil industry—such as Acidizing, Perfojet, and the Electric Pilot—contact your local Dowell Station. Or, if you prefer, write directly to Dowell Incorporated, Tulsa 1, Oklahoma, Dept. I-11.

*A service mark of Dowell Incorporated
**U. S. Patent No. 2,354,570—licensed only to Dowell Incorporated

This is Jel X 500, used in Stratafrac. This viscous fluid holds sand in suspension, in ratios up to 7 lbs. per gallon, predetermined to meet formation characteristics. No gel-breaker solution is required.

—chemical services for the oil industry

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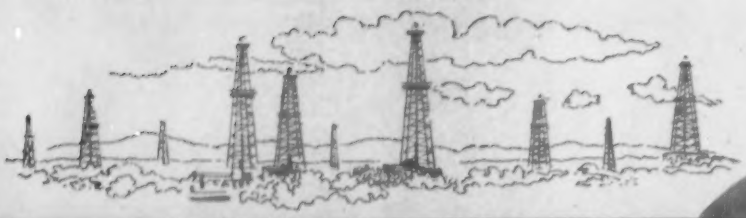
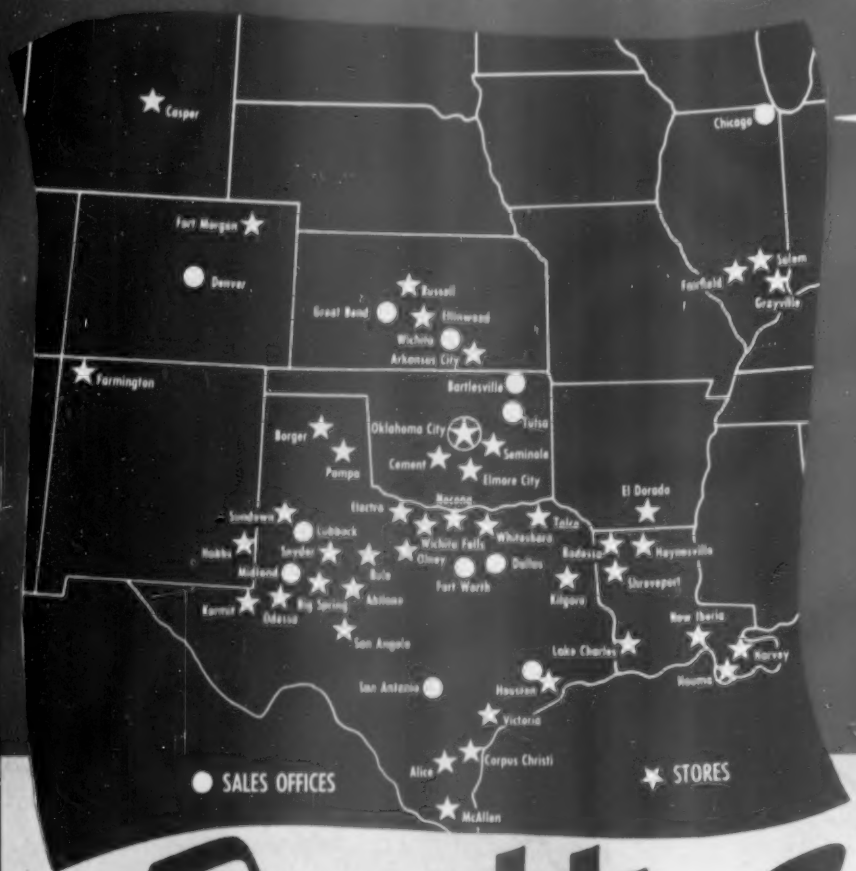
Does Republic have a store near where I'm going to drill some wells?



YES SIR! 43 STORES

and 12 Sales Offices Serving this Oil Country



We, at Republic, have one aim . . . to supply you and the oil industry with the finest in oil field drilling and production equipment. Our 55 service points are backed by 44 years of experience in serving the industry.

Trained specialists with experience, and selective "know-how", have been organized to anticipate, as well as satisfy the oil man's needs. A large, select list of manufacturers assures the availability of the best products for every need!

YOUR SUPPLY R STORE

Republic Supply COMPANY

OKLAHOMA CITY 1, OKLAHOMA

EXPLORATION

Ellenburger Strikes Fire West Texas

by Frank J. Gardner

THE twin capitals of West Texas have long been rivals for the affections of the oil industry in that area. Midland has been content to claim the company administrative offices, while Odessa captured the supply and service agencies. Together, the two constitute the double nucleus of a far-flung oil province.

Ironically, Nature long ago had cached away a priceless chain of oil pools halfway between the two cities; now, millions of years later, the secret is being revealed, and its disclosure has been described as the most important West Texas find since Scurry County.

Headlee was first . . . It all began in eastern Ector County in January 1953, when Texas Gulf Producing Co. completed its 1 Headlee to open Headlee field (A on map). Producing from the Ellenburger at 13,106-13,313 ft., the discovery flowed 643 bbl. of oil per day to mark the discovery of a major oil field. Since that time, 22 wells have established an Ellenburger pay section 400 ft. thick, and each well is expected to produce a million barrels or more on the present 80-acre spacing pattern. In addition to the Ellenburger wells, four Headlee producers are flowing from the Devonian at 11,800 ft.

New links in the chain . . . Now, new Ellenburger eye-openers have set off a flurry of excitement along a 40-mile trend southeast of the field. Headlee itself received a major extension across Highway 80 and into western Midland County with the completion this month of British-American Oil Producing Co. et al 1 Parks (B on map) for 740 bbl. of oil per day. Oil flow is coming from the Ellenburger at 13,246-13,328 ft. The discovery, 1¼ miles southeast of the nearest well in Headlee, is expected to double the previous estimated area of the field.

Attention is now concentrated on an active test at C on the map; this is Forest Oil Corp. and Cities Service Oil Co. 1 Dora Roberts B-1. As drilling approaches the Ellenburger top, observers predict another major find at the well; it has topped Devonian 170 ft. higher than did the Parks discovery 3½ miles northwest. Besides having had showings in the Pennsylvanian-Bend at 10,176 ft. and in the Devonian at 11,295 ft., operators have recorded free oil on tests of the Silurian-Fusselman at 12,141 ft.

This field indicator lies halfway between Headlee field and Virey field (D on map), where Pennsylvanian-Bend oil was discovered at 10,170 ft. in December 1953, followed by Ellenburger oil at 13,300 ft. only 2 weeks later.

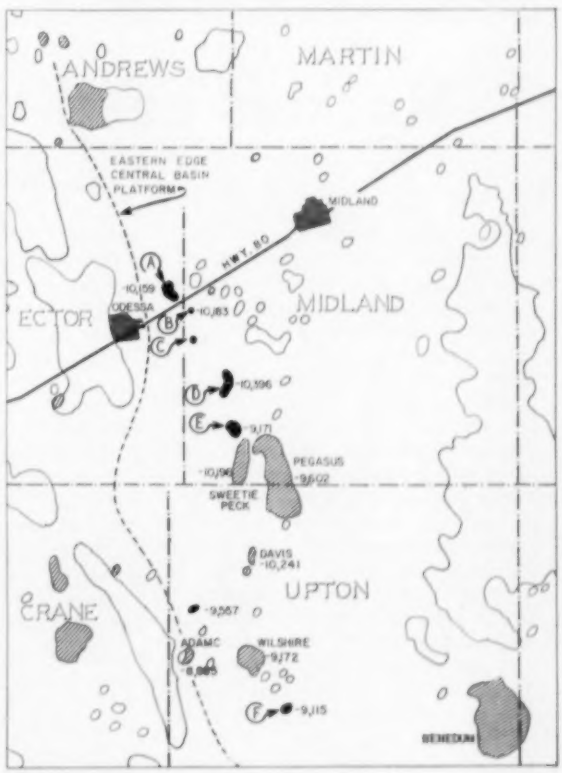
The southern trend . . . Virey field and War-San field (E on map) represent deep oil development in 1954 along the eastern edge of the famous Dora Roberts ranch. War-San Ellenburger production was discovered in June as the first production on the Roberts lease proper.

South and east of War-San field lie the older Pegasus and Sweetie Peck Ellenburger fields. Only a fraction over a mile now separates the Peck and War-San areas, and Forest 1-46 Roberts, now drilling in the extreme southeast corner of the Roberts ranch, holds the key to a link-up of the two fields.

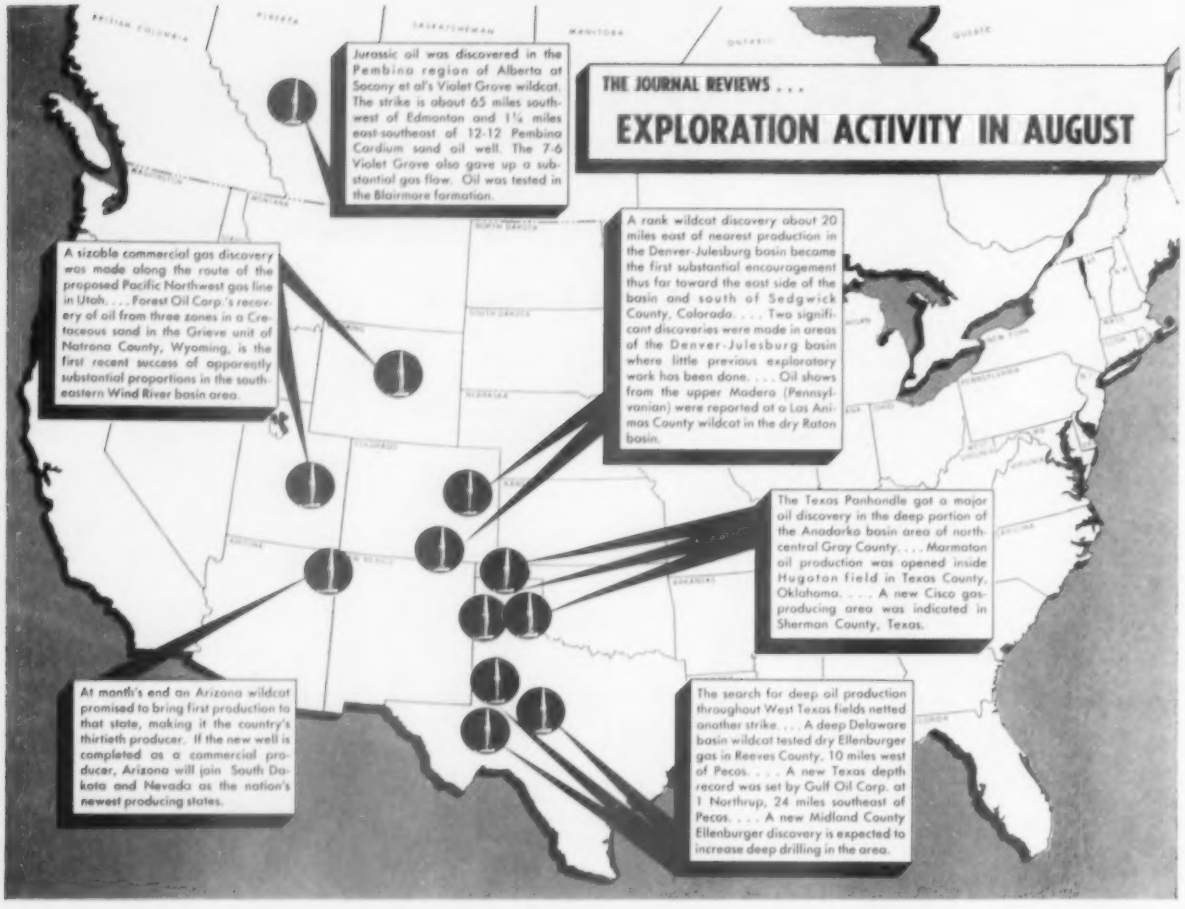
No failures yet separate War-San from Virey, nor Virey from Headlee, and indications point to a solid band of Ellenburger pools some 20 miles long, from Headlee across southwestern Midland County to the north line of Upton County. Additional drilling will likely prove the presence of a uniserial succession of ovoid structures, not only between Headlee and Sweetie Peck, but possibly as far south as Amacker field (F on map), a turn-of-the-year 12,000-ft. Ellenburger strike at Hunt Oil Co. 1 Amacker, in Upton County.

Major reserves due . . . A great deal of drilling remains to be done in the 40-mile stretch between Headlee and Amacker fields (A to F) before West Texas operators have the answer to the Ellenburger reservoir riddle, but in the drilling, it's safe to assume that many new and major oil reserves are going to be uncovered on the west side of the Midland basin.

Midland and Odessa will both reap the immediate benefits, West Texas the reserves, and the industry will gain the glory as one link after another is forged in the Ellenburger oil chain.



Ellenburger discoveries during the past year are shown in black; shaded fields represent older Ellenburger production. Figures are subsea top of Ellenburger in discovery wells.


THE JOURNAL REVIEWS . . .
EXPLORATION ACTIVITY IN AUGUST
Jurassic oil was discovered in the Pembina region of Alberta at Socony et al's Violet Grove wildcat. The strike is about 65 miles southwest of Edmonton and 1¼ miles east-southeast of 12-12 Pembina Cardium sand oil well. The 7-6 Violet Grove also gave up a substantial gas flow. Oil was tested in the Blairmore formation.
A sizable commercial gas discovery was made along the route of the proposed Pacific Northwest gas line in Utah. . . . Forest Oil Corp.'s recovery of oil from three zones in a Cretaceous sand in the Grieve unit of Natrona County, Wyoming, is the first recent success of apparently substantial proportions in the southeastern Wind River basin area.
A rank wildcat discovery about 20 miles east of nearest production in the Denver-Julesburg basin became the first substantial encouragement thus far toward the east side of the basin and south of Sedgwick County, Colorado. . . . Two significant discoveries were made in areas of the Denver-Julesburg basin where little previous exploratory work has been done. . . . Oil shows from the upper Madero (Pennsylvanian) were reported at a Las Animas County wildcat in the dry Raton basin.
The Texas Panhandle got a major oil discovery in the deep portion of the Anadarko basin area of north-central Gray County. . . . Marmaton oil production was opened inside Hugoton field in Texas County, Oklahoma. . . . A new Cisco gas-producing area was indicated in Sherman County, Texas.
At month's end an Arizona wildcat promised to bring first production to that state, making it the country's thirtieth producer. If the new well is completed as a commercial producer, Arizona will join South Dakota and Nevada as the nation's newest producing states.
The search for deep oil production throughout West Texas fields netted another strike. . . . A deep Delaware basin wildcat tested dry Ellenburger gas in Reeves County, 10 miles west of Pecos. . . . A new Texas depth record was set by Gulf Oil Corp. at 1 Northrup, 24 miles southeast of Pecos. . . . A new Midland County Ellenburger discovery is expected to increase deep drilling in the area.

Rockies Lead the Discovery Race

by John C. McCaslin

THE end of summer saw the Rocky Mountain region leading the exploratory pace in the nation. New discoveries and indicated strikes of considerable importance were reported from Wyoming to Arizona; from Utah to the Denver-Julesburg basin. Canada's Pembina region got back into the wildcat news with discovery of Jurassic oil. The deep-discovery spree in West Texas areas netted sizable new strikes. The Texas Panhandle got one of its best oil wells this year, helping to keep the Hugoton embayment out front in Mid-Continent drilling.

August total completions were down 10 per cent from July's all-time high. Wildcatters finished 1,051 wells, up 69 over July. Cumulative completions for the nation at the end of 8 months stood at 35,657 wells compared to 32,086 for the same period last year. Cumulative footage drilled so far in 1954 has soared to a record 146,326,247 ft.

The Rockies race . . . The Denver-Julesburg basin, Arizona, Wind River basin, Utah, and the Raton basin all reported significant developments in August.

The dog days saw two good pools opened up in the Denver-Julesburg basin. J. M. Thomson 1 Heiserman, eastern Washington County, Colorado, rank wildcat, was completed as a shut-in gas well after recovering gas at the rate of 2,500 M.c.f. per day on test of the D sand. The new pool is far toward the east side of the Denver-Julesburg basin, about 20 miles east of established producing areas.

Ryan Oil Co. et al. got a good J sand oil discovery 12 miles southwest of Colorado's big Adena field along the general trend of basin production. The 1 Doss was finaled flowing 30 bbl. of oil per hour on ¾-in. choke. It is directly north of Leader gas-field production and west of the Little Beaver-Badger Creek producing areas. About 18 miles to the southeast in Washington County, New Drilling Co. recovered 3,180 ft. of oil on a drill-stem test of the D sand. On later tests the wildcat pumped 130 bbl. of oil. This success is 3½ miles southeast of Badger Creek in an area of little previous activity.

Shell Oil Co. may add the third producing state this year at its 2 East Boundary Butte wildcat in Apache County, Arizona. The well got the best test yet for an Arizona well, recovering gas at the rate of 3,450 M.c.f. per day on a test of the upper Paradox (Pennsylvanian). The wildcat is located in the extreme northeastern part of the state on the edge of the Black Mesa basin, 8 miles southeast of Utah's Boundary Butte field. It is drilling deeper.

In Natrona County, Wyoming, Forest Oil Corp. 1 Morton 22-1 in the Grieve Unit, flowed oil on a 10-minute test at the estimated rate of 100 bbl. per hour on one test. Subsequent tests

Total August Completions, Exploration and Development

	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Active operations
Ala.-Ga.-Fla.	11	0	0	11	0	5	5	1	0	0	61,312	8
Arkansas	64	25	0	39	12	39	10	2	1	0	234,946	35
California	154	103	1	50	25	54	40	20	12	3	698,702	220
Colorado	91	23	7	61	3	25	59	4	0	0	497,584	91
Illinois	239	142	0	97	98	141	0	0	0	0	581,442	400
Indiana	47	24	1	22	46	1	0	0	0	0	64,610	99
Kansas	376	192	26	158	45	317	14	0	0	0	1,298,202	344
Kentucky	87	32	16	39	58	29	0	0	0	0	182,774	124
Louisiana	350	233	30	87	137	26	41	58	69	19	2,063,264	261
North	189	150	11	28	134	20	24	9	2	0	515,208	60
South	161	83	19	59	3	6	17	49	67	19	1,548,056	201
Michigan	55	17	2	36	32	18	5	0	0	0	136,653	125
Mississippi	40	17	0	23	0	3	20	11	6	0	272,406	45
Montana	24	10	1	13	7	3	10	2	2	0	107,772	62
Nebraska	55	24	2	29	6	15	34	0	0	0	279,899	41
New Mexico	80	53	18	9	6	48	15	7	4	0	381,472	111
New York	32	16	0	16	32	0	0	0	0	0	48,000	30
North Dakota	28	15	0	13	0	8	3	17	0	0	190,950	35
Ohio	91	33	28	30	61	30	0	0	0	0	178,993	184
Oklahoma	620	383	18	219	250	253	72	38	6	1	2,066,321	746
Pennsylvania	110	29	46	35	65	9	36	0	0	0	418,766	156
South Dakota	2	0	0	2	2	0	0	0	0	0	3,947	1
Texas	1,893	1,087	107	699	523	650	452	194	55	19	8,444,221	1,148
N. Central (7-B & 9)	722	421	6	295	332	273	108	9	0	0	2,266,278	298
West (7-C & 8)	434	324	5	105	54	132	138	64	27	19	2,472,902	361
Panhandle (10)	96	47	34	15	16	72	3	4	1	0	321,456	40
East (5 & 6)	90	32	14	44	9	42	35	4	0	0	453,834	92
Gulf Coast (2 & 3)	254	120	21	113	25	57	83	71	18	0	1,581,479	179
Southwest (1 & 4)	297	143	27	127	87	74	85	42	9	0	1,348,272	178
Utah	11	1	1	9	5	1	4	1	0	0	41,523	23
West Virginia	67	3	47	17	31	36	0	0	0	0	181,123	212
Wyoming	76	46	0	30	6	12	50	7	1	0	449,388	174
Miscellaneous	§2	0	0	2	0	1	1	0	0	0	9,488	¶7
Total August 1954	4,605	†2,508	351	*1,746	1,450	1,724	871	362	156	42	18,893,308	‡4,682
Total July 1954	5,148	2,867	413	1,868	1,662	2,018	943	343	134	48	20,634,485	**5,063
Cumulative 1954	35,657	19,957	2,614	13,086	10,989	13,951	6,664	2,607	1,059	387	146,326,247	
Cumulative 1953	32,086	16,598	2,536	12,952	9,676	13,232	5,631	2,342	922	283	130,595,097	
Western Canada	203	121	23	59	26	117	58	2	0	0		
Alberta	102	59	19	24	12	36	52	2	0	0		
Saskatchewan	72	43	2	27	6	62	4	0	0	0		
Manitoba	26	19	0	7	8	17	0	0	0	0		
B. C.-N. W. T.	3	0	2	1	8	1	2	0	0	0		
Cumulative 1954	1,353	777	101	475								

*Incl. 76 service wells: Kans. 4, N. Y. 16, Ohio 6, Okla. 25, Pa. 23, Texas Gulf Coast 1, S.W. Tex. 1. †Incl. 31 condensate wells: S. La. 16, Texas Gulf Coast 6, S.W. Tex. 9. ‡Incl. all wells rigged up and/or drilling at month's end. §Incl. Wash. 1, Nev. 1, ¶Incl. Wash. 2, Nev. 2, Ariz. 1, Mo. 2. **Revised.

. . . and the Month's Wildcats

	Total	Oil	Gas	Dry	Footage	1954 Comp.	1954 (1,000 ft.)	1953 Comp.	1953 (1,000 ft.)
Ala.-Ga.-Fla.	10	0	0	10	57,939	72	402	74	390
Arkansas	20	2	0	18	73,535	103	421	83	290
California	39	2	1	36	201,386	383	1,898	436	2,157
Colo.-Utah-Wyo.-Mont.	84	2	2	80	467,439	632	3,583	441	2,501
Tri-States	31	1	0	30	71,655	436	846	649	1,285
Kansas	57	6	3	48	226,844	468	1,833	612	2,304
Louisiana	65	16	5	44	558,716	366	3,384	326	2,908
North	26	5	4	17	144,797	113	659	101	601
South	39	11	1	27	413,919	253	2,725	225	2,307
Michigan	15	3	0	12	37,337	159	357	178	435
Mississippi	18	3	0	15	136,551	107	747	139	989
Nebraska	22	2	0	20	111,454	103	538	110	556
New Mexico	8	1	2	5	41,256	103	718	103	690
North Dakota	13	0	0	13	62,753	72	373	44	255
Oklahoma	61	7	0	54	218,946	525	2,233	536	2,306
South Dakota	2	0	0	2	3,497	13	69	12	66
Texas	593	112	29	452	2,840,294	3,648	17,991	3,584	17,519
North Central	233	66	3	164	782,938	1,467	5,132	1,468	5,229
West	113	24	2	87	688,010	693	4,199	577	3,431
Panhandle	16	0	2	14	81,127	68	377	19	98
East	41	3	5	33	199,433	221	1,145	202	1,007
Gulf Coast	87	12	9	66	594,133	577	4,241	604	4,328
Southwest	103	7	8	88	494,653	622	2,897	714	3,426
Others	13	0	3	10	54,607	94	399	71	281
Total August 1954	1,051	157	45	849	5,164,209	7,284	35,792	7,398	34,932
Total July 1954	982	138	32	812	4,773,340				
Cumulative 1954	7,284	1,056	256	5,972	35,791,775	7,284	35,792		
Cumulative 1953	7,398	1,073	271	6,054	34,931,560			7,398	34,932
Western Canada	67	5	8	54					
Cumulative 1954	466	63	47	356					

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Cementrol Shoe, Running in Position Fig. 325-A

Cementrol Collar, Fig. 425

Flapper Type Float Collar, Fig. 404 M&F

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had higher flows. The Wind River basin discovery, one of the best for the state this year, had 68 ft. of saturation. The well is shut in currently for storage after flowing 1,000 bbl. per day on choke.

This is the first test on the Grieve unit, which is 35 miles west of Casper. The unit comprises 25,000 acres. If the producing sand is identified as Mesaverde, interest in this area of the north-central Rocky Mountains would pick up considerably. The pay sand was tentatively identified only as a Cretaceous sand.

In Utah, International Development & Drilling Co. 1 Linney, Entrada test in the Southwest Bar-X area of Grand County, flowed at the estimated rate of 5,000 to 7,000 M.c.f. of gas per day to increase interest in exploration along the proposed route of the Pacific Northwest gas line. The strike is of importance to Piceance Creek basin exploration.

At month's end a possible Pennsylvanian oil discovery was in prospect for the dry Raton basin in Las Animas County, Colorado, at Bruce Sullivan Drilling Co. 1 Dutto. The wildcat tested oil shows from the upper Madero section in an area where no Pennsylvanian production is found for more than 100 miles. The test is the first encouragement in the stepped-up drilling campaign in this rather small basin of southern Colorado and northern New Mexico. A fishing job is holding up current operations at the wildcat.

West Texas . . . There is added incentive for deeper drilling in Midland County as a result of a new Ellenburger discovery at British-American Oil Producing Co. et al. 1 Roy Parks, Jr., 3 miles east of Odessa.

The discovery was finished for a flowing potential of 739 bbl. of oil per day. A 300-ft. Ellenburger section was indicated at the big well with more than 100 ft. of perforations made.

A Terry County wildcat got flush production from what was tentatively identified as either the Devonian or Siluro-Devonian. Anderson-Prichard Oil Corp. 1 Oil Development Co., 30 miles from nearest Devonian wells in a previously unexplored area, was finaled for a calculated potential of 940 bbl. of oil per day.

Dry gas from the Ellenburger was reported at Gulf Oil Corp.-Phillips Petroleum Co. et al. 1 Toyah Unit, closely watched Delaware basin wildcat. The deep test made an estimated 5,000 M.c.f. of gas per day at 14,787-14,888 ft. The Ellenburger showing while not as encouraging as oil recovery would have been, does give impetus to the increased hopes for deep pre-Permian production in the big basin.

Gulf Oil Corp. 1 Northrup, deep Reeves County test, became Texas' deepest hole. The wildcat passed 18,000 ft. in August and was headed for the Devonian objective at 18,500 ft. The old depth record for the state was set in 1951 at Superior Oil Co. 27 Minnie S. Welder near Corpus Christi in San Patricio County.

Hugoton embayment . . . Phillips Petroleum Co. 1 Delp gave the Texas Panhandle a good oil discovery in the deeper portion of the Panhandle's section of the Anadarko basin in Gray County. The Pennsylvanian granite wash strike was finaled for 257 bbl. of oil per day on ¼-in. choke.

Oceanic Oil Co. opened the first oil production inside the Oklahoma Panhandle's Hugoton Permian gas field area at 1-A Swinger in Texas County. The Marmaton (Pennsylvanian) discovery was put on the pump after swabbing 21 bbl. of oil in 9 hours.

Humble Oil & Refining Co. opened the Stratford area's second indicated new Cisco-Pennsylvanian gas pool at 1 Sheldon, 3 miles southwest of Kerrick in the northeastern part of Dallam County, Texas. The gas prospect is 7 miles west of recently opened Stratford-Cisco gas field and 17 miles south of Oklahoma's Keyes-Pennsylvanian gas and oil district. The wildcat is drilling ahead.

TEXAS

EAST TEXAS

Rusk County Venture Yields Travis Peak Oil

Continued tests at Magnolia Petroleum Co. 1 Don Langston, 7 miles east of Mount Enterprise, have brought on leasing activities in southeastern Rusk and northwestern Shelby counties.

After recovering oil on drill-stem tests in the Travis Peak between 7,190-7,210 ft., operators treated with 500 gal. of mud acid. The well started flowing, making 7 bbl. of 47° oil in 9 hours, plus an estimated 200,000 cu. ft. of gas a day.

Location for a new Rusk County wildcat has been made 3 miles southeast of Glenfawn. The new project is Stanolind Oil & Gas Co. 1 Henry Hightower, in Jose M. Martinez Survey, A-23, which is about 4 miles northwest of Trawick gas field. Drilling contract calls for 8,000 ft., or to the Travis Peak.

WEST TEXAS

Winkler Wildcat Finds Water Table

Barnes and Lyman 1 Kerr, multipay prospect in the Emperor Deep field, was ready for production tests after finding the Ellenburger water level on a test between 11,615-11,668 ft. The test developed a good flow of gas but recovered salt water with no oil shows.

Since entering the Ellenburger at 11,435 ft. oil shows have indicated a possible pay section of 120-180 ft. in thickness. The well has also indicated production in the Fusselman and Devonian.

Tom Green County . . . A new Strawn discovery, or long extension northeast of the one-well Christoval South field, was in prospect at Chambers & Kennedy 1-C Johnson, Section 67, Sam Fitzgerald Survey. Intermittent production was obtained from perforations between 5,254-58 ft., the well making about 5 bbl. of oil before dying.

Gray Wolfe Co. has filed application to drill an Ellenburger wildcat in northwestern Tom Green County as 1 Abe Mayer Estate. Location will be 9 miles northwest of Bohemia and just south of Strawn production in Arden field. Projected depth was 7,200 ft. Location is 4 miles southwest of a 7,300-ft. dry hole drilled by Phillips as 1 Turner. This well had top of the Ellenburger at 7,070 ft. on elevation of 2,187 ft.

Crockett County . . . Development drilling has added a fourth well to the West World-Strawn field, southwest of Big Lake. Cities Service Oil Co. 2-C Shannon rated a calculated 1,576 bbl. daily on the basis of a 3-hour gage of 196.9 bbl. of oil through ¾-in. choke. Pay section was perforated at intervals between 8,076-8,176 ft.

Ector County Wildcat Finds Pennsylvanian Oil

The Texas Co. 1 Ratliff et al, 4½ miles northwest of Headlee field, reported good oil shows in the Pennsylvanian Bend section. A 3-hour drill-stem test between 10,575-10,600 ft. had gas in 40 minutes and recovered 540 ft. of heavily oil-cut mud.

Crane County . . . Atlantic Refining Co. 1-36 Everitt & Glass, 10 miles north of Crane, developed oil shows on a test of the Fusselman from 11,463-11,520 ft. The 1-hour test recovered 1,000 ft. of water blanket cut with oil and gas, plus 120 ft. of heavily oil and gas-cut mud. Drilling continued below 11,577 ft.

NORTH TEXAS

Old Wells Yield New Oil

Recompletions in Grayson and Throckmorton counties have added new pays to the areas. In Grayson County, a re-drill job made a small discovery from an old dry hole, and in Throckmorton a workover on a depleted well gave good flowing production from a new zone.

B. M. Hester & Son have completed 1 C. B. Bradshaw, 6 miles southwest of Sherman in central Grayson County, for a pumping potential of 35½ bbl. of 32° oil a day. Top of pay was 7,026 ft. and final perforations were between 7,026-34 ft. The well was originally drilled to 9,100 ft. by Standard Oil Co. of Texas.

In Throckmorton County, James H. Snowden 1 R. A. Mills, depleted Caddo and upper Strawn producer, has been recompleted from a new Strawn zone, between 3,550-55 ft. Flowing potential was 154½ bbl. of 38° oil on 12/64-in. choke. Flowing pressure was 250 psi. and gas-oil ratio was 544 cu. ft.

Baylor County drew a deep exploration at Burt Drilling Co. 1 W. T. Waggoner estate, located 7 miles east of Mabelle and 6 miles northeast of nearest production. Projected depth is 5,200 ft.

In Wilbarger County, Gray Oil Co. reentered 2-K Waggoner estate, in Section 10, Block 14, H&TC Survey, 3 miles southwest

of Harrold, and recompleted the well as a good flowing discovery. The well was originally drilled to 3,311 ft. in 1953 and finished as a dry hole. Pay was found at 3,182-87 ft. on drill-stem test and completion was for 153 bbl. of oil a day through 32/64-in. choke. Tubing pressure was 100 psi.

TEXAS GULF COAST

Two Hardin County Fields Add New Producing Zones

New producing zones were opened the past week in both the North and West Silsbee areas of northeastern Hardin County. Both discoveries were by American Republics Corp. and Houston Oil Co. of Texas, joint operators in these fields.

The new-pay discovery at North Silsbee was made in the operators' 2 James Rafferty Fee, completed with a potential of 14,900,000 cu. ft. of gas daily from Yegua sand at 6,614-18 ft. Gas-condensate ratio was 31,973 cu. ft. per barrel. Gravity of the condensate was 64.6°. Shut-in pressure gaged 2,408 psi.

The discovery, located east of other production, gives the field its ninth reservoir. Twenty wells, 16 oil and 4 gas, have been completed.

In the West Silsbee area, 3 miles to the southwest, gas-condensate production was opened in the previously unproduced Yegua "Z" sand, perforated at 7,939-43 ft. Discovery was in the above operators' 5 Elliott, which received an open-flow potential rating of 8,450,000 cu. ft. of gas per day with condensate recovery in the ratio of 17,262 cu. ft. of gas per barrel of fluid. Shut-in pressure gaged 2,669 psi. Gravity of the fluid was 59.5°.

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The well is a location southwest of an oil producer in the field's Yegua "U" sand at 7,250-58 ft. The only other gas well in the area is 1 mile to the southwest at Hampton. Its production is from a 7,600-ft. Yegua sand.

New Gas-Condensate Area Opened in Lavaca County

Discovery of a new gas-condensate producing area has been made by Union Producing Co. in southern Lavaca County, near the Jackson County line.

Discovery well, 1-C Otto Borchers, completed in Wilcox sand, perforated at 8,525-27 ft., flowed at the rate of 1,810,000 cu. per day, open-flow potential, with gas-condensate ratio of 42,200 cu. ft. per barrel. Fluid gravity is 58°.

Hole had been drilled to 14,428 ft., and has casing cemented at 13,231 ft.

Location is in the R. Williams Survey, 17 miles southeast of Yoakum.

SOUTHWEST TEXAS

Deep Showings Tested In LaSalle County Wildcat

Initial tests in Standard Oil Co. of Texas' deep wildcat, 1 South Texas Syndicate, in H&GN Survey, 7½ miles southwest of Fowlerton, in eastern LaSalle County, indicate a possible new gas and condensate producing reservoir in that area.

The prospective producing horizon is perforated at 10,258-320 ft. and 10,340-46 ft. with casing cemented at 10,448 ft. and bottom of the hole at 11,525 ft.

In preliminary tests through drill-pipe the well flowed at rates up to 820,000 cu. ft. of gas per day through chokes, showing some 51.5°-gravity condensate, and making a small amount of water. Flowing pressure through ⅜-in. choke was 640 psi.

Operations Suspended In Williamson County Test

Shell Oil Co. has suspended operations in its much-watched deep wildcat, 18 miles northwest of Georgetown, in northwestern Williamson County, following a series of tests through the Ellenburger section, in which showings of oil and gas were encountered.

The wildcat, 1 Purcell, in the West Delaney area, was drilled to 9,479 ft. in granite. More than 20 drill-stem tests were attempted at various levels through the Ellenburger prior to running casing through the section to 7,457 ft. and plugging back originally to 7,414 ft.

Since then, the section has been tested in a succession of perforated intervals from the bottom to the top around 6,930 ft. Most encouraging tests were of a perforated interval at 7,085-7,118 ft., where the well flowed initially at the rate of 1,600,000 cu. ft. of gas per day. The gas flow was accompanied by water at the rate of 144 bbl. per day, and later declined to 126,000 cu. ft. per day with 72 bbl. of water.

Latest tests have been in a perforated interval at 6,935-7,045 ft. with hole plugged back to 7,050 ft.

ILLINOIS

In Saline County Calvert Drilling Co., Inc. recovered 660 ft. of clean oil, 120 ft. oil-cut mud with no water on a 2-hour drill-stem test

in the Waltersburg sand at 2,117-22 ft. Nearest production to the discovery is more than 1 mile. It is 2½ miles northeast of Eldorado in 2-8s-7e.

In Clay County Geo. Callum and Don Lawhead are swabbing 8 bbl. of new oil per hour after fracture treatment of the Aux Vases sand at 2 Thomas Bemis, SE NE SE 15-3n-8e, 2 miles east of Clay City. The well is an old one worked over and fractured.

Ashland Oil & Refining Co. 1 Wilson, NE SW NW 17-8s-7e, 1 mile north of Eldorado in Saline County, recovered 1,200 ft. of clean oil from the McClosky lime topped at 2,978 ft. This is the Eldorado area's first McClosky saturation.

HUGOTON EMBAYMENT

New Gray Area Gets Second Confirmation

Location has been staked for the second confirmation to Gray County, Texas Panhandle's important new producing area recently opened at Phillips Petroleum Co. 1 Delp.

The new well will be Phillips 1-A Talley, 10 miles southwest of Miami in Section 118, Block M-2, BS&F Survey. It will go to 10,200 ft. It is 1½ miles southwest of the 1 Delp, one of the Panhandle's most important new discoveries.

The first confirmation attempt to the 1 Delp was staked earlier at 1-A Troy, 8 miles southwest of Miami in Section 86, Block M-2, BS&F Survey. It also will go to 10,200 ft., ot the Arbuckle.

Dallam County . . . Humble Oil & Refining Co. has set 5½-in. casing at 3,700 ft. to test the 1 Sheldon, 7 miles west of Stratford-Pennsylvanian Cisco gas field, a recently opened producing area west of Hugoton gas production in the northwestern part of the Panhandle.

Gas shows were recovered in the upper Pennsylvanian on tests at 2,710-3,628 ft.

New Oklahoma Panhandle Oil Strike Awaits Potential

The Keyes gas field area of northwestern Texas County has a new oil discovery.

It is Shell Oil Co. 1 State Unit B, NE NE SW 30-6n-10eCM. The well is waiting on potential after gaging 212 bbl. of oil and 1,210 M.c.f. of gas daily. The strike has Keyes (basal Morrow Pennsylvanian) production from perforations at 4,638-42 ft.

New Beaver area . . . A 2-mile northeast extension to new Southeast Mocane field in Beaver County has been completed by United Producing Co.

The 1 Barby, NE SW 36-5n-25eCM, flowed 15,300 M.c.f. of gas per day from the Morrow sand perforations at 6,894-6,920 ft.

Kiowa County Kansas Has Mississippian Strike

Aladdin Petroleum Corp. 1 Johansen, SE SE 13-28s-19w, 3 miles west of Greensburg is shut in as a Mississippian gas-distillate discovery.

The wildcat flowed 1,000 M.c.f. of gas per day with distillate through perforations at 4,860-90 ft.

APPALACHIAN AREA

WEST VIRGINIA

Middle Fork district, Randolph County, West Virginia, Washington Natural Gas Co. 2-4 E. S. Newlon heirs, wildcat, elevation 2,216 ft., was a good gas well gaging 1,154,000 cu. ft. gas, from the Gordon and Fifth sands, TD 1,587 ft.

Glade district, Webster County, Gregory Gas Co. 1 G. W. Miller, tested 1,305,000 cu. ft. gas in the Maxon sand, topped at 1,415 ft., TD 1,485 ft.

OHIO

The best result obtained from a fracture job, and probably the largest initial production of any Clinton well in the state, was completed by Swartz, Adair et al on 1 Harry Stone in Section 34, Washington Township, Hocking County. Sand was logged at 2,763-2,794 ft. with 17 bbl. natural, which increased to 1,200 bbl. with 700,000 cu. ft. gas, in a 24-hour test after treatment. The producer was in an area most operators thought to be condemned by dry holes.

The National Gas Co.'s second test in Wadsworth Township, Medina County, resulted in a 107 bbl. producer, after fracturing Clinton sand found at 3,815-3,840 ft. The test was on 1 Lewis Thomas, Lot, and made 40 bbl. natural.

PENNSYLVANIA

In Banks Township, Indiana County, Southwest Pennsylvania, Keta Oil & Gas Co. and Columbian Carbon Co., have started operations at 1802 Farmers and Miners Trust Co., rank wildcat, elevation 1,963 ft. It is on the

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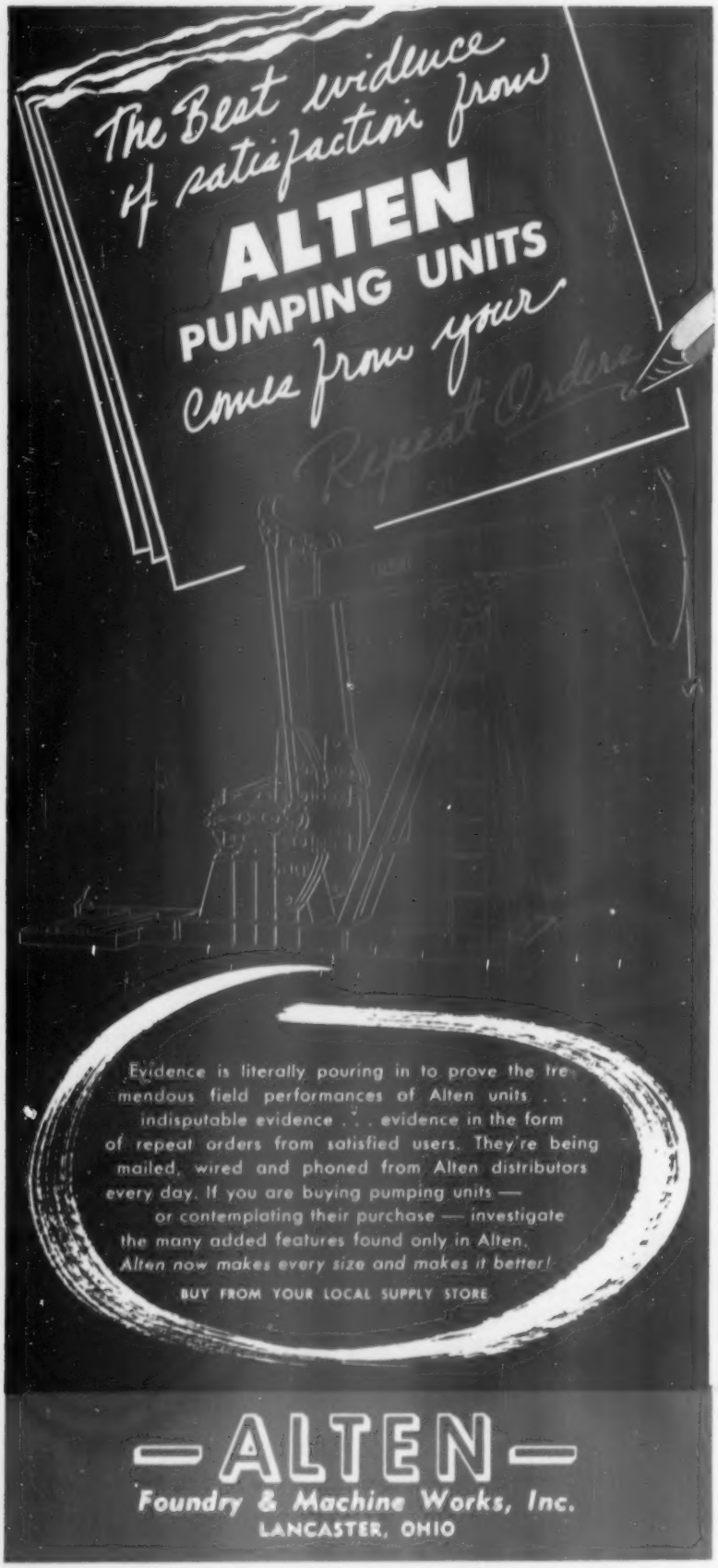
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Punxsutawney Quadrangle 1.59 miles south of latitude 40 degrees 55 minutes and .28 mile west of longitude 78 degrees 50 minutes. Drilling is at 240 ft.

In Pine Township, Fryer & Hanson 1 Lucinda Mitchell, elevation 1,670 ft., was dry, Oriskany sand 8,169 ft., TD 8,199 ft.

Connellsville Township, Fayette County, Peoples Natural Gas Co. 1 F. K. Buttermore heirs, recorded the Onondaga at 8,880 ft., chert at 8,894 ft., drilling at 9,028 ft.

LOUISIANA

NORTH LOUISIANA

New Pettit Trend Appears To Be Developing In DeSoto

There is some interesting development going on along the southeast extension of old Bethany field of Panola County, East Texas, and extending into Caddo and DeSoto parishes, northwestern Louisiana.

A strip of Pettit production is shaping up extending for about 25 miles from South Hallsville to Longstreet field in DeSoto Parish. The width of the trend is about 2½ to 3 miles.

The latest impetus to this new trend that is still in its infancy is Jack Grigsby's 1 Schuler estate, 10-13n-15w, in the Longstreet area of DeSoto Parish. The wildcat is located 5 miles due southeast of nearest Pettit production which is on line with Bethany field production in East Texas. The extension discovery is 2 miles due southeast of nearest Longstreet field production. Longstreet field gets Rodessa (Glen Rose) production. None of this field's wells have evaluated the Pettit zone.

The 1 Schuler estate took a dril-stem test at 6,487-6,513 ft. using ¼-in. choke. It tested an estimated 6 ft. of the Crane section of the Pettit horizon. Gas reached the surface in 3 minutes with top pressure going to 500 psi. The operator closed the tool fearing a blow out or lost control. The wildcat is drilling ahead below 6,525 ft. Objective is 7,500 ft. This will test the Travis Peak.

Nearest Pettit production to this indicated significant hit is Gilster & Kemp 1 Moseley & Garland, 25-14n-16w. This was the discovery well of Pettit production in the Longstreet field area. It is 1½ miles northwest of Longstreet field productcion at A on map. The discovery well had a calculated open flow of 29,000 M.c.f. of gas per day plus 60 bbl. condensate per million from the Pettit through perforations at 6,325-53 ft. It was a dual discovery, having Gloyd production, also.

SOUTH LOUISIANA

Manila Village Wildcat Showing for Production

Humble Oil & Refining Co. has an indicated gas-condensate discovery well in the Manila Village area, of Jefferson Parish. It is at the company's 1-S Louisiana Land & Exploration Co., located 1 mile north of present production in the area.

Testing continues, latest reported test being of sand interval at 11,746-52 ft., from which the well flowed at the rate of 1,157,000 cu. ft. of gas and 65 bbl. of 52.9°-gravity condensate per day through ⅛-in. choke with pressure of 3,400 psi.

In a previous test, with perforations at 11,717-22 ft., the well flowed an ungaged

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volume of gas and condensate through ¼-in. choke with 5,380-psi. pressure.

Total depth is 12,243 ft. with casing at 12,242 ft.

Wildcat in Gillis Area Completed as Producer

Discovery of a new oil-producing reservoir north of the old Gillis-English Bayou field, northeast of Lake Charles, in northeastern Calcasieu Parish, has been made by Richardson & Bass. Location is 1 mile from nearest production.

The discovery well, 1 Drew, completed in sand interval at 8,104-09 ft., flowed 214 bbl. of 37.6°-gravity oil during a 24-hour gage through 8/64-in. choke. Gas production was at the rate of 950 cu. ft. per barrel of oil. Flowing pressure gaged 1,350 psi.

The test originally was scheduled to go to 13,000 ft. but stopped at 10,733 ft. Casing was run to 9,500 ft.

Chacahoula Production Gets 1½-Mile Extension

Production at Chacahoula, in Lafourche Parish, has been extended 1½ miles to the northeast around the dome with the completion by Howell, Holloway & Howell of their 1 Energy as a 42-bbl. oil well, flowing through 6/64-in. choke.

Flow was under pressure of 3,400 psi. with gas-oil ratio of 448,000 cu. ft. per barrel. Pay zone is in Miocene sand at 12,640-41 ft. The well was drilled to 14,643 ft. and had at least six other sands with indications of commercial production, one showing oil, and the others gas and condensate.

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KANSAS

New Ellis Discovery Has Possible Dual Pay Zones

Two pay zones are indicated at Veeder Supply & Development Co. and North American Car Corp. 1 Irwin, NW NW NW 11-11s-20w, 3 miles east of Mendota pool in the northeastern section of Ellis County.

Recovery on a drill-stem test in the Lansing was 120 ft. gas, 350 ft. heavily oil-cut mud and 980 ft. gassy oil with 1,230 psi. bottom-hole pressure. Another test taken at 3,363-93 ft. gave 780 ft. of gas, 100 ft. heavily oil-cut mud and 1,300 ft. of oil with 1,200 psi. Recovery on the third test at 3,397-4,406 ft. was 610 ft. of gas, 175 ft. oil and 55 ft. salt water with 1,230 psi. pressure. The fourth and last Lansing test at 3,462-98 ft. recovered 5 ft. of mud.

Recovery in an Arbuckle test at 3,634 ft. to 3,640 ft. total depth was 110 ft. gassy oil and 60 ft. very heavily oil-cut mud.

Thomas County Oil Pool is Indicated

A new pool for Thomas County is indicated at Derby Oil Co. and Van Grisso 1 Kistler, SE SE SE 34-9s-23w.

Recovery in the Lansing on drill-stem test at 4,353-75 ft. was 150 ft. heavily oil-cut mud, 90 ft. watery oil and 270 ft. of heavily oil-cut water. The indicated strike is 9 miles west of Mingo pool and 12 miles south of the town of Colby in the central part of the county.

MICHIGAN

A second Dundee oil well appeared to be in prospect for East Wheatland field, Mecosta County, at The Moco 1 Skalitzsky, NW NE SE 8-14n-7w, Wheatland Township. Up to now, this area has had one good Dundee oil producer, Rex Oil & Gas Co. 1 Skalitzsky, 1,100 ft. due west of the new well, and several dry holes.

The Moco well logged oil pay, and probably Dundee top, at 3,699 ft. Hole filled full with oil, and was ready to flow in 1 hour. Tanks and flow control equipment were being moved to well-site. The Moco indicated that production would be restricted to about 50 bbl. daily, at least until after tubing had been run. No water was in evidence on early tests. The first oil well in the Wheatland area was drilled in 1946.

The long-awaited Richfield oil test in the center of Fork Dundee oil pool, Fork Township, Mecosta County, was officially announced this week. Rotary rig was being moved to location and drilling will be started immediately.

This Fork pool 5,000-ft. Richfield oil test will be drilled at the 1 Ralph Unit, NE SW NW 8-16n-7w. Test will be drilled and operated by Gulf Refining, with support from both Sun Oil Co. and Smith Petroleum Co., the two other major producers in the pool.

Fork Dundee pool was opened in 1942 by a wildcat drilled by Sun and supported by Gulf and Smith. In all, there were 2,700 drilled acres in the Dundee pool.

Sun, in 1945, drilled a Richfield sand dis-

covery well about 2½ miles northwest of the current Richfield test well on the edge of the pool. The Sun deeper zone producer, in the S½ SE NE 2-16n-8w, logged its Richfield pay in sand; was followed by several dry holes and no producers.

CALIFORNIA

New Miocene Pool for Midway-Sunset Area

An edge well in the old Midway-Sunset field of westside San Joaquin Valley has indicated it will result in a new Miocene sand discovery. The test, Exeter Oil Co. 11 Murphy Fee in SW SW 28-32s-24e, was in process of completion the first of last week after 7-in. casing had been set at 5,319 ft.

With hole bottomed at 5,360 ft., a formation test of the interval 5,315-60 ft. resulted in 30°-gravity crude flowing at a 140 bbl. hourly rate. Additional tests at 4,457-4,600 ft. and 4,600-50 ft. resulted in gas flows at daily rates of 2,000 M.c.f. The operator holds a 60-acre lease around the potential discovery, with bulk of offsetting acreage being held by Standard Oil Co. of California and The Texas Co.

Tejon Outpost Staked

Drilling & Production Co. has staked a wildcat about 1 mile west of the Olcese pool recently discovered by Reserve Oil & Gas Co. in the Tejon Ranch area of southeast San Joaquin Valley. The test will be 33 J. V. in 33-11n-19w. At the discovery area in Section 34, Reserve completed its fifth 5,700-ft. producer, was preparing to complete a sixth, and had 48-27 Reserve-Pauley under way in Section 27.

Belgian Anticline Tests

Offsets to the west and south have been started at the new 5,800-ft. find recently completed by Ohio Oil Co. at Belgian Anticline in Kern County. Pacific Western Oil Co. was under way with 62-A Anderson to the south while Ohio was below 2,000 ft. with 2 F. E. Smith. The discovery, 1 Smith in SE 23-30s-21e, was completed earlier this month at a depth of 5,608-86 ft. flowing 1,030 bbl. of 33°-gravity crude through an 18/64-in. choke.

New Castaic Hills Pool

Richfield Oil Corp. added a new producing interval at the Castaic Hills field 30 miles northwest of Los Angeles. Its 82-35 Rynne-Fisher in NE NE 35-5n-17w, originally completed in the Sterling sand above 5,175 ft., was deepened to 6,018 ft. and completed in the new pay at 5,449-6,009 ft. Initial production was at the rate of 276 bbl. of 35°-gravity crude daily through a 12/64-in. choke. Gas-oil ratio was approximately 500 cu. ft. per barrel.

Rincon Outpost Redrilling

General Petroleum Corp. was preparing to pull the 5½-in. liner in its ½-mile west extension attempt to the Rincon field, Ventura County. With perforated liner landed at 7,301 ft., its 101 Ferguson swabbed and flowed 350 bbl. of fluid during a 5-day period. The test will be plugged back and redrilled in an attempt to improve oil production.

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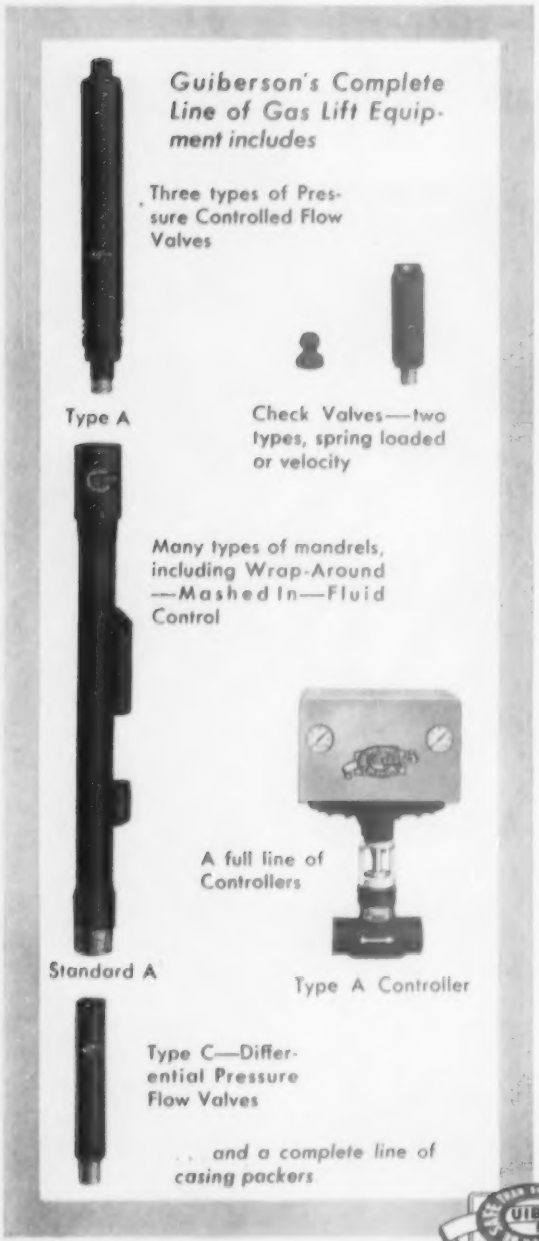
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OKLAHOMA

Big Well In Stephens County Reported Flowing

An 800-bbl. plus well is reported at Vickers Petroleum Co. 1 Sturm in new Prairiedale pool, Stephens County.

The well flowed 440 bbl. of oil in 11 hours on various chokes. The daily flow rate is in excess of 800 bbl. Production is from the Baker sand. Perforations are at 5,246-52 ft. The well is in SE SE SW 27-1n-5w.

Sterling Oil Completes Two Big Wells in Oklahoma

Sterling Oil of Oklahoma, Inc., Tulsa, as operator, and Waray Oil Co. of Oklahoma City, have two large oil wells in the process of completion in North Barnes field, Garfield County.

In the Marshall zone, Sterling and Waray's 1 Wolfe, NE NE SW 34-24n-3w, perforated between 4,870 and 4,888 ft. for a natural flow of 15 bbl. per hour through a ½-in. choke. When the right to produce by dual completion is granted by the Corporation Commission, the first Wilcox sand will be perforated between 4,816-26 ft. On test this formation made gas in 2 minutes, and oil in 8 for an estimated flow of 73 bbl. per hour.

The firms' 1 Worrell, SE SE NW 34-24n-3w, a north offset to the Wolfe, perforated the Marshall between 4,824-32 ft. with four holes to the foot. On test the 1 Worrell flowed naturally through casing at a rate of 22 bbl. per hour through a ½-in. choke.

Up the hole in both wells a 40-ft. section of Skinner sand showed good saturation during drilling. The 1 Worrell may be dually completed in this and the Wilcox sand.

The 2 Wolfe, SE NE SW 34-24n-3w, is the firm's third test of the acreage. This well is now drilling below 3,600 ft.

West Chitwood Pool Gets Second Producer

The second well and confirmation to new West Chitwood pool in Grady County has been completed.

It is The Texas Co. 1 Foley-Whitener Unit, C NE NE 25-5n-7w. It is a first Deese sand producer. Production is from perforations at 9,222-39 ft. The well is complete on swab gage of 360 bbl. of oil in 24 hours. Gravity of the oil is 37.2°.

E. J. McCurdy, Jr., and E. R. Bahan have a Deese sand discovery 1½ miles northeast of West Chitwood pool at 1 Bowen, C SW SW 18-5n-6w. The discovery flowed 23 bbl. of new oil hourly through ½-in. tubing choke following fracture. Perforations are at 9,972-10,011 ft. Operators await pipeline connections. Later the well flowed 35 bbl. per hour on ¾-in. choke.

The discovery well of West Chitwood pool was Mercury Drilling Co. 1 Whitener Unit, C NW NE 25. It was opened last year flowing 240 bbl. of oil from the Deese sand through perforations at 9,369-77 ft. on 28/64-in. choke.

KENTUCKY

EASTERN KENTUCKY

On Quicksand Creek in Breathitt County, United Fuel Gas Co. have a dry hole at

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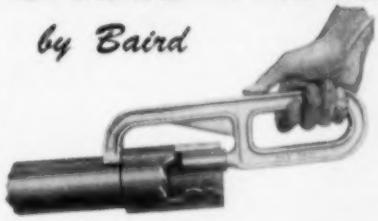
by Baird



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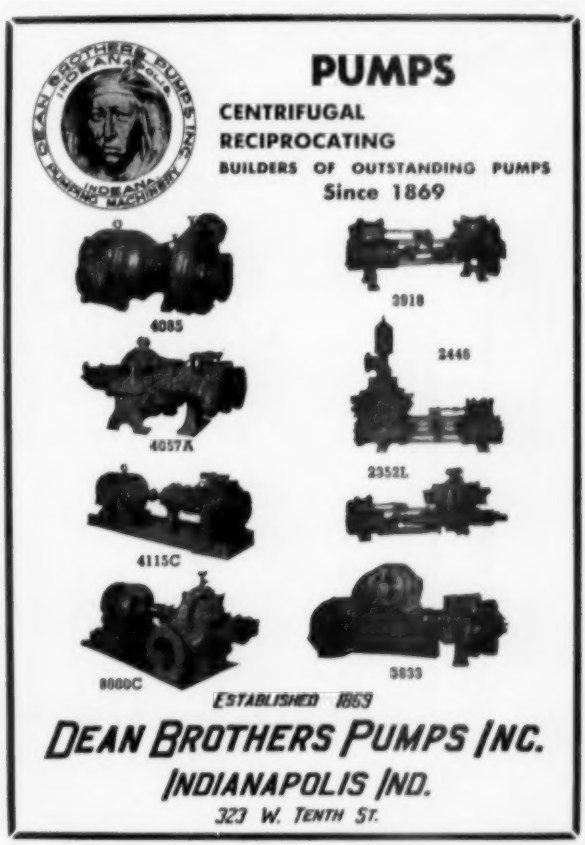

their 8283 Pearl Watkins, a wildcat test. Hole was bottomed at 2,200 ft. in the Corniferous lime with no commercial shows recorded.

In Big Sandy gas field and located on Beefhide Creek in Pike County, Kentucky West Virginia Gas Co. have completed 6204 Samuel Mullins for 7,557,000 cu. ft. of gas daily from Mississippian Big lime topped at 2,417 ft. and penetrated to 2,651 ft. total depth. Well was natural with a rock pressure of 640 psi. in 24 hours.

CANADA

Three Provinces Report Oil and Gas Discoveries

Two gas strikes in Alberta, an oil discovery in Saskatchewan, and indication of possible commercial oil production at a southwest Manitoba wildcat were scored in western Canada during the past 7 days.

Alberta . . . One of this week's gas discoveries was made in the Turin area of southern Alberta by Western Leaseholds, Ltd., of Calgary. This strike, at Western 33-7 Turin, LSD 7, 33-11-19w4, flowed its gas from the Bow Island sand. During a 2-hour drill-stem test from 2,718-32 ft., gas flowed at maximum rate 1,520,000 cu. ft. daily. Only pipe recovery was about 5 ft. of mud. Hole is being deepened, as it is scheduled to test the Mississippian formation.

This venture lies about 20 miles northeast of Lethbridge and is 3¼ miles southwest of the Bailey-Turin Mississippian gas discovery well.

The other Alberta gas discovery this week came at a Texaco Exploration Co. exploratory well in the Deville area, 25 miles east and southeast of Edmonton. This well struck its gas in the Viking sand during test from 2,844-84 ft. Gas flowed in 3 minutes at maximum rate 3,700,000 cu. ft. daily, and formation water also reached the surface. Pipe recovery was 75 ft. of mud-cut salt water. Thickness of the gas section above the water line has not been released, however, top of the Viking was entered at 2,845 ft.

This well, Texaco A-12-2 Deville, LSD 12, 2-52-20w4, is 13 miles northeast of Joarcam Viking oil field and 2 miles northwest of an Imperial Oil, Ltd., abandonment.

Saskatchewan . . . Snell Oil Co. chalked up the lone Saskatchewan discovery this week, as its 5-12 Viewfield driller 4 miles east of Mississippian formation oil wells at Midale gave up a sizable recovery of crude oil during drill-stem test in the Mission Canyon member of the Mississippian. The well, situated in LSD 5, 12-6-10w2, is about 88 miles southeast of Regina.

A 1 hour drill-stem test run from 4,684 to 4,730 ft. flowed gas at rate of 200,000 cu. ft. daily and yielded a recovery of 1,600 ft. of oil, 600 ft. of heavily oil and gas-cut mud and 130 ft. of gas-cut mud with oil that was slightly water-cut. String of production casing was set preliminary to running production tests.

Manitoba . . . The Manitoba oil encouragement came at the Dome-Harris Cox 14-23 Ebor wildcat, LSD 14, 23-9-29w1, which is 2¼ miles west of the southwest tip of Daly oil field.

Drill-stem tests, logs and cores warranted the setting of production casing for evaluation tests. After setting 5-in. production casing at 2,686 ft. and a sand-frac treatment was applied to the interval 2,686 to 2,711 ft. After load oil was swabbed out, formation oil was recovered at rate of 2 bbl. hourly, with B.s. and w. cut being 12 per cent. Pump unit was being installed at latest report.

The team of Hudson's Bay Oil & Gas Co., Ltd., Amurex Oil Development Co. and Richfield Oil Corp. of California, has flowed oil from the D2 Devonian at the ¾-mile offset to the Mississippian and D2 oil discovery well the group drilled in the Hespero area of Alberta earlier this year. During August this offset driller had also flowed oil from the Mississippian, so is also indicated as a dual zone oil producer.

The well, Hudson's Bay-Amurex-Richfield 16-32 Medin, LSD 16, 32-38-3w5, is about 22 miles west of Red Deer and 85 miles north of Calgary. It lies about ¾ mile northeast of the team's 1-2 Medin dual zone oil discovery well and 4 miles northwest of the H.B.-Gulf 1 Evarts, Blairmore sand gas and condensate discovery well.

D2 Devonian was entered at 8,642 ft., or 5,535 ft. subsea (K.B. elevation 3,107 ft.) and 1½-hour drill-stem test was run from 8,684-8,709 ft. There was a weak initial blow, becoming strong in 1½ minutes. Natural gas reached the surface in 10 minutes at rate 349,000 cu. ft. daily, water cushion flowed in 40 minutes and oil in 55 minutes, at rate of 18 bbl. in 30 minutes. After 90 minutes, with oil flow continuing, gas flow rate was measured at 1,260,000 cu. ft. daily. Recovery consisted of 8,000 ft. of crude oil and 270 ft. of salt water. Crew at last report was drilling ahead at 8,719 ft.

Canadian Gulf Oil Co. released details of a drill-stem test that flowed oil from the Mission Canyon section of Mississippian at its ½-mile north development well in the Frobisher area of southeast Saskatchewan. Oil flow rate was 36 bbl. per hour.

This well is Canadian Gulf-Canadian Devonian 3 Collopy, LSD 3, 2-4-4w2, ½-mile

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north of Gulf's 11 Moffatt oil well. After coring into the Mission Canyon porosity the well was drill-stem-tested from 4,651 to 4,661 ft. About 25 ft. below the Mission Canyon contact. During this 65-minute drill-stem test, natural gas reached the surface in 4 minutes, and oil flowed in 25 minutes. The oil was flowed to the pits for 10 minutes to clean out, and then was flowed to the test tanks for 30 minutes, making 18 bbl. or a rate of 36 bbl. hourly. Pipe recovery was 300 ft. of oil, no water. Hole is bottomed at 4,661 ft. and crew is preparing to core ahead.

Documents Available

The following documents may now be obtained at the office of the Chief Mining Recorder, Mines Branch, Department of Mines and Natural Resources, Winnipeg.

1. Cumulative Schedule of Wells for 1953. Includes the location, drilling date, final status, surface casing, elevation, and total depth on all wells drilled in 1953. Geological formation tops, core and sample intervals, drill-stem tests, and production casing are given for field wells and for wildcat wells released from confidential status. The monthly production figures for each well are tabulated.

2. Stratigraphic Map Series, No. 1. A structure cross-section, comprising eight wells, extending from the Saskatchewan boundary east through Virden to Range 11 WPM, and south to Pilot Mound.

3. Stratigraphic Map Series, No. 2. A north-south structure cross-section from North Dakota, through Coulter to Ewart. Contains seven wells.

4. Stratigraphic Map Series, No. 3. A north-south structure cross-section, from Woodnorth to 20 miles north of Russell.

ROCKY MOUNTAIN

WESTERN NEBRASKA

Cheyenne County Apparent Discovery Tested

Ryan Oil Co.-Davis Oil Co. recovered 4,205 ft. of oil on 1½-hour test of J sand at 1 Itner, NW NW NW 9-15n-52w, Cheyenne County. Test was of the zone 5,383-5,404 ft. There was gas at the surface after 12 minutes, and flowing pressure was 150-1,310 psi. The operator reported a core 5,370-5,423 ft. which recovered 20 ft. of saturated sand, with 12 ft. of the section showing good porosity and permeability. At last report the well was drilling below 5,423 ft. The apparent discovery is about 4½ miles north of the town of Potter and about 2½ miles south of a currently testing discovery by Gem Oil Co. at 1 Woten, NE NE NW 29-16n-62w.

COLORADO

New Washington County Discovery Tested

Wytex Service Co. and Rex Monohan reported recovery of 1,200 ft. of oil and 240 ft. of heavily oil-cut mud at 1 Forbes, C SW SE 14-1n-54w, Washington County. Recovery was from the J sand. Tool was open for 1¼ hours. Flowing pressure was 300 psi. at the end of the test. The operator cored 4,989½-5,004 ft. with recovery of 10½ ft. of sand, saturated and with good porosity and permeability and 4 ft. of wet sand. Total depth is 5,032 ft. and the operators are running casing.

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New Field Discovery Completed in Weld County

Phillips Petroleum Co. has completed 1 Arnold-King, SE SW NE 13-11n-57w, pool opener at Spurgin field, Weld County. The well flowed 106 bbl. of oil per day through 16/64-in. choke. Production is from D sand at 6,424-40 ft.

Big Beaver Discovery Completed for 605 BOPD

New Drilling Co. has reported a potential of 605 bbl. of oil per day, pumping and flowing at 1 Blomenkamp, C NE NE 17-3s-56w, Washington County. Production is from J sand perforations 4,992-98 ft. The well is about 5 miles southeast of Badger Creek field, and is one of several to offer recent encouragement and stimulate activity east of previous production in the area.

Jackson County Discovery Nearing Final Tests

Lion Oil Co. has run casing to 3,968 ft. at 1 Dwinnell, C NE SW 23-10n-78w, Jackson County. The operator will perforate and test the Frontier (?) zone which made 1,140 ft. of oil and 180 ft. of gas-cut mud on drillstem test 3,872-3,917 ft. The apparent discovery is about 2½ miles north of the McCallum unit.

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WYOMING

Sheridan County Discovery Tested

Shell Oil Co. has perforated and begun testing at its apparent discovery in the Decker area, Sheridan County, about 2½ miles southeast of Ash Creek field. The well is 1 Hallworth, SE NE NE 31-58n-84w. Perforations are in Ash Creek sand at 4,886-4,902 and 4,907-18 ft. The well flowed 197 bbl. of oil and 70 bbl. of load water in 14 hours. Another test flowed 25 bbl. of oil and one of load water in 1 hour. Tests are continuing.

Skelton Dome Wildcat Recovers Gas

Mobil Producing Co. recovered gas at the rate of 1,500 M.c.f. per day on test of Frontier at F-22-32-G, C SE NW 32-45n-99w, in the Skelton Dome unit, Hot Springs County. The operator tested after coring 16 ft. of sand with the top 5 ft. saturated from the zone 3,605-21 ft. Pressures and other details were not reported. Recovery in pipe was 280 ft. of gas-cut mud and muddy water.

The well is the second drilled on this unit by the operator. The first, about 2 miles to the northwest had noncommercial shows of oil in Phosphoria and Tensleep.

MONTANA

Hailstone Dome Gas Discovery Tested

Northern Natural Gas Producing Co. recovered gas at the rate of 6,700,000 cu. ft. per day on test of two Cat Creek zones at 2 NP, C NW SE 31-5n-20e, in the Big Coulee-Hailstone Dome area, Valley County. The well was acidized at 1,981-88 and 1,952-69 ft. and the two zones tested separately. Recoveries were 3,500,000 and 3,200,000 cu. ft. day, respectively.

Total depth is 2,145 ft., and top of Third Cat Creek was logged at 1,934 ft. The well is ½-mile north of a noncommercial (24,000 cu. ft.) gas well drilled by The Texas Co. in 1948.

Northern Natural is drilling a second well at 3 NP, C SE NW 29-5n-20e, about 1¼ miles to the northeast. The firm has previously drilled a failure about 2 miles south of the discovery.

Landslide Butte Wildcat Abandoned

Carter Oil Co. and Union Oil Co. have abandoned their joint wildcat, 1 Tribal-544, C NW NW 19-37n-8w, in the Landslide Butte area of Glacier County. The well has been testing over a period of several weeks after oil was recovered in Lower Mississippian zones. On early tests the well flowed 77½ bbl. of oil in 24 hours. Following acid treatment, recovery of water increased, with a steady decrease in the amount of oil recovered.

The wildcat is in the disturbed belt from the Rocky Mountains through this portion of Montana. When early oil recoveries were reported the well was regarded as one of the most potentially important developments of the year for the state. A considerable amount of interest was evidenced by heavy lease work through the area, and other lands offered by the Blackfeet Indians commanded good bonus bids.

Union and Carter are testing another well, possibly also a disappointment in the Cadmus

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4. *Non-corrosive qualities* that make handling easier and safer.
5. *Low freezing point* for easier, all-weather application.

With Hyflo's powerful fast action, water and viscous emulsions are removed from oil producing formations or from induced fractures where connate waters or water from drilling muds have combined with fracturing oils to clog flow towards the well bore. Hyflo is extremely effective in lowering the interfacial tension between oil and water as proved in field results. A 0.1 per cent Hyflo concentration in oil has shown measurements *as low as 0.6 dynes* per centimeter in various oil well brines.

Hyflo is an *emulsion breaking* agent—not an emulsifying agent. Does not act to form an emulsion or reverse an already existing emulsion.

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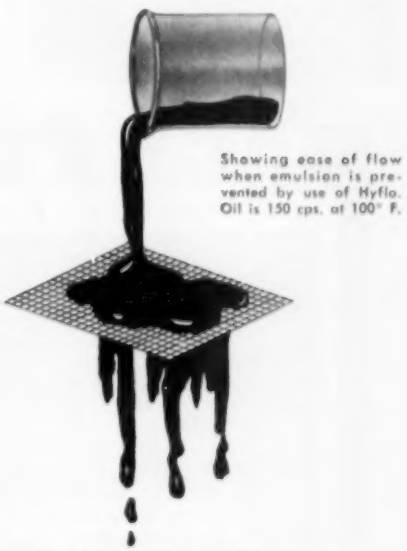
Thick emulsion of a fracturing oil and water, resting on a 16 mesh screen. Viscosity too thick for accurate measurement.



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area, 25 miles to the southeast. This is 1 Miller-Tribal, C NW NE 7-33n-6w. It made 3,800 ft. of oil on drill-stem test of lower Mississippian zones, and is now being pumped with recovery of only a small amount of oil.

Sumatra Area Extension Successful

McAlester Fuel Co. and Goldston Oil Co. swabbed at the rate of 85 bbl. of oil per day at 1-A Grebe, NW NW NW 14-11n-32e, in the Northwest Sumatra area of Rosebud County. The extension to the field is of more than routine interest since it offsets a previous failure by The Texas Co., and illustrates the lensing of producing sands in the area. Sand development in the current well is reported good, while failures in the immediate vicinity have reported little.

MISSISSIPPI

Second Producer Indicated In New Paluxy-Sand Field

Confirmation of Mississippi's recent Paluxy oil discovery near Bolton, in western Hinds County, is in the making with the new field's second test, south offset to the discovery well, showing for a good oil producer.

The indicated confirmation well, 1 Lancaster-McAlpin Unit, drilled by Sun Oil Co., in a drill-stem test at 9,946-67 ft. in the discovery well's pay zone, filled 2,500 ft. of oil against the 1,550-ft. water cushion in 15 minutes through ¼-in. chokes. No water was indicated. Gravity of the oil ranged from 30.6° in samples taken at the top of the recovery to 35° in samples at the bottom. Bottom-hole pressure gaged 3,100 psi. flowing, and 4,400 psi. shut in for 10 minutes.

The discovery well, 1 Lettie McAlpin, drilled by Larco Drilling Co. on a Sun Oil Co. farmout, was completed last July with initial flow of 274 bbl. of 35.4°-gravity oil daily through ⅛-in. choke. Its pay interval (perforations) is 9,920-40 ft. Its production was the first from the Paluxy in Mississippi.

Four additional tests already are drilling in the immediate area, including a north offset to the discovery well by Magnolia Petroleum Co., a west offset by Stanford-Wells-Lutken, an east offset by Larco, and a southwest diagonal offset by Sun.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

District 1

Atascosa County: Harrell & Southworth 1 Davis, W. W. Robbins Sur., A-1392. IP 62 BOPD, 12/64-in., 43.1°, Navarro 4,632-42 ft. (perforations). TD 4,676 ft. (New field.)

Bastrop County: General Crude Oil Co. 1 1 Grohmann et al, Mary Williams Sur. Dry. TD 5,443 ft.

Bexar County: Frank E. Janiak et al 1 Gembler, Juan Montes Sur., A-11. Dry. TD 1,150 ft.

William H. Spice, Jr., et al 1 Jasik, David Oaks Sur. Dry. TD 4,347 ft.

Travis County: Robert C. Pfaffman 1 Hinze, Thomas B. Westbrook Sur. Dry. TD 890 ft.

Williamson County: Stoffregen, Rush & Purvis 1 Simmons, Pedro Zarza Sur. Dry. TD 680 ft.

Wilson County: G. R. Schimmel and Leland Palmer 1 Johnson heirs, A. Green Sur. 275. IP 1,470 M.c.f. daily, open flow. Dry. Carrizo 440-46 ft. (perforations). TD 475 ft. (New field.)

G. R. Schimmel and Leland Palmer 2 Henrietta Johnson, A. Green Sur. 275. IP 1,720 M.c.f. daily, open flow, dry. Carrizo 460-64 ft. (perforations). TD 501 ft.

G. R. Schimmel and Leland Palmer 1 Robles, M. Herrera Sur. 435. IP 365 M.c.f. daily, open flow. Dry. Carrizo 480½-86½ ft. (perforations). TD 511 ft.

District 4

Duval County: Tri-Mark Oil Co. and Casa Grande Oil Co. 1 DCRC, GC&SF Sur. 297. Dry. TD 1,887 ft.

Kleberg County: Humble Oil & Refining Co. 1 State Tract 143, Laguna Madre. Dry. TD 9,156 ft.

San Patricio County: Jay Simmons 1 McDaniel, Sec. 14, George H. Paul Subd., Coleman-Fulton Pasture. Dry. TD 7,441 ft.

Webb County: Appell Oil & Gas Corp. 1 Adami, GB&CNG Sur. 422, A-2096, Certificate 164. Dry. TD 7,477 ft.

Zapata County: Dillard & Waltermire Drilling Co. 2 Marrs McLean estate, Blk. 3, J. A. Harvey Subd., El Javali Grant. Dry. TD 1,899 ft.

TEXAS GULF COAST

District 2

Bee County: Sunray Oil Corp. 1 Salge, O. H. Delano Sur., A-153. Dry. TD 5,407 ft.

DeWitt County: Continental Oil Co. 1 Hausman, Thomas H. Bell Sur., A-75. IP 1,720 M.c.f. daily, open flow, Frio 3,000-08 ft. (perforations). TD 8,498 ft. (New pay in Meyersville field.)

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WILDCAT COMPLETIONS

Goliad County: Southern Minerals Corp. 1 Powell, Daniel Gil Martin Sur., A-431. Dry. TD 3,965 ft.

Jackson County: Carribean Oil Corp. 1 Heard, Francis Menefee Sur., A-51. Dry. TD 7,115 ft.

Live Oak County: Atlantic Refining Co. 1 George West estate unit, Blk. A, George West Subd., L. A. Fant Sur., A-602. Dry. TD 9,500 ft.

District 3

Chambers County: Michel T. Halbouty and Olin Oil & Gas Corp. 1 Hirsch-Miller Unit, Solomon Barrow Sur., A-37. Dry. TD 8,509 ft.

Colorado County: Geotek Oil Co. et al 1 Hopkins-McLane, I&GN Sur. 47, A-322. Dry. TD 6,808 ft.

Harris County: Gulf Coast Leaseholds, Inc., 1 Allison et al, W. J. Lovett Sur., A-526. Dry. TD 5,513 ft. (Mykawa area.)

Harrell Oil Co. 1 Hildebrandt, James Cooper Sur., A-189. Dry. TD 7,107 ft.

Texas State Drilling Co. 1 Sweeney, F. Rankin Sur., A-57. Dry. TD 9,092 ft.

Liberty County: Austral Oil Exploration Co., Inc., and Drilling & Exploration Co., Inc., 1 Elliott Smith, W. D. Smith Sur., A-106. Dry. TD 10,750 ft.

Matagorda County: Magnolia Petroleum Co. 1 Rugeley, A. Sheppard Sur. 1, A-383. Dry. TD 16,514 ft.

Orange County: J. C. Means, Jr., and William Seale 1 Powell, David S. Suddeth Sur., A-179. Dry. TD 8,530 ft.

Tyler County: Humble Oil & Refining Co. 1 Mrs. Ella M. Goolsbee estate, R. H. Cousins Sur., A-744. Dry. TD 8,800 ft.

Walker County: Jack Clark 1 Bellinowski, C. A. Sleight Sur., A-496. Dry. TD 3,470 ft.

Wharton County: San Juan Exploration Co. 1 Holman-Wilbeck, Lot 8, A. Jackson Sur., A-34. Dry. TD 4,002 ft.

EAST TEXAS

Kaufman County: F. R. Jackson 1 Roosth & Genecov, E. Higdon Sur., A-197. Dry. TD 3,585 ft.

TEXAS PANHANDLE

Gray County: Phillips 1 Delp, M-2-110, BS&F. IPF 257 BOPD, Penn. granite wash, 9,558-69 ft., 43.6°, ¼-in. TD 9,569 ft. (Oil discovery.)

Wheeler County: Stanolind Oil & Gas Co. 1 Dunn, A-5-26, H&GN. Dry. TD 3,998 ft. Geol. wildcat.

Gray County: Phillips Petroleum Co. 1 Delp, 110-M2-BS&F. Sur., 6½ miles SE Quinduno field. IP 257 BOPD, ¼-in., 43°, GOR 800 cu. ft., TP 600 psi. Perforated Pennsylvanian 9,558-69 ft. TD 9,569 ft.

WEST CENTRAL TEXAS

Callahan County: W. D. Austin 1 Snyder, Sec. 142, BBB&C Sur., 5 miles NE Baird. IP 360 BOPD, 16/64-in., 43°, TP 320 psi., GOR 400 cu. ft., Ellenburger perforations 4,424-48 ft. TD 4,448 ft.

Warren & Wico 1 Tom Odom, Sec. 15, BBBB&C Sur. Dry. TD 1,493 ft.

Ted Weiner 1 Price Campbell, Sec. 34, BBB&C. Dry. TD 3,993 ft.

Coleman County: Hickok & Reynolds 2 Miller, C. M. Mann Sur. 76. Dry. TD 2,714 ft.

Shackelford County: B & H Production Co. 1 Dyer, 74-12-T&P. Dry. TD 1,006 ft.

Taylor County: Currie & Wylie and M. D. St. John 1 Knox, J. E. Sheppherd Sur. 96. Dry. TD 4,360 ft.

NORTH TEXAS

Archer County: Archer Drilling & Production Co. 1 Baughman, Blk. 130, John Harris Subd. Dry. TD 1,390 ft.

Quincey J. Lee 1-B Perkins, Blk. 35, J. J. Perkins Subd. Dry. TD 1,536 ft.

R. W. McDonnell 2 Staples, Blk. 42, W. E. Roberts Sur. Dry. TD 1,482 ft.

L. C. Young 1 Estill Fee, BBB&C Sur., A-41. Dry. TD 1,511 ft.

Baylor County: Burk Royalty Co. 1-A Fayette CSL, Fayette CSL Sur., 4 miles NW Rendham. Dry. TD 5,900 ft.

Grayson County: Holliman & Lynn Drilling Co. et al 1 Yeager, J. Jennings Sur., A-645. Dry. TD 6,530 ft. Ellenburger 6,285 ft.

Standard Oil Co. of Texas 2 Stout, B. J. Hutson Sur., A-496, ½ mile S McKeon field, 2 miles NW Sherman. IP 350 BOPD, plus 6,179 M.f.g., 19/64-in., TP 4,430 psi., GOR 17,655 cu. ft., Oil Creek sand 10,456-10,474, 10,504-10,516 ft. TD 10,607 ft.

Knox County: Burt Oil Co. and D. P. Stephenson 2 Burns, 21-2-D&W. Dry. TD 1,850 ft.

Montague County: Arnold H. Bruner & Co. 1 Gregory, J. R. Watts Sur., A-864. Dry. TD 6,552 ft.

Redman Bros. 1 Adams, R. H. Grimes Sur., A-288, 6 miles NE St. Jo. IP 87 BOPD, 20/64-in., 41°, TP 30 psi., pay 2,535 ft. TD 2,542 ft.

Wichita County: Consolidated Oil Co. 1 Cruse, Blk. 9, Cherokee CSL. Dry. TD 1,418 ft.

Consolidated Oil 2 Cruse, Blk. 10, Cherokee CSL. Dry. TD 1,450 ft.

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WILDCAT COMPLETIONS

Wilbarger County: Fortex Oil Co. 1-D Waggoner estate, J. Coleman Sur., A-1607. Dry. TD 2,428 ft.

Young County: Roy Huff, Jr. 1 Dunagan, TE&L Sur. 170. Dry. TD 977 ft.

Lewis D. Terry 1 Kunkel, TE&L Sur. 402. Dry. TD 1,149 ft.

WEST TEXAS BORDER COUNTIES

Coke County: Ashman & Hilliard, Ltd. 2 Bridges, 386-9-J, Orth Sur. Dry. TD 4,462 ft.

Fisher County: General Crude Oil Co. 1 Parker, Sub. 13, Bastrop CSL Sur. 314, 1 mile N Roby. IP 20 BOPD, ¼-in., Canyon pay 5,305 ft. TD 7,020 ft.

Youngblood & Youngblood 1 Humphries, 46-1-HT&B. Dry. TD 6,150 ft.

Nolan County: West Central Drilling Co. 1 Ensminger, 36-5-T&P. Dry. TD 6,645 ft. Elev. 2,509 ft., Ellenburger 6,162 ft., Cambrian 6,612 ft.

Runnels County: Service Drilling Co. 1 McCord, Sec. 320, G. W. Bailey Sur., 5 miles SE Crews. IP 245 BOPD, 20/64-in., 43°, TP 240 psi., perforated 3,309-19 ft. TD 3,323 ft.

Stonewall County: Seaboard Oil Co. 3-B Upshaw, 62-D-H&TC. Dry. TD 6,533 ft. Elev. 1,743 ft., Caddo 6,014 ft., Ellenburger 6,444 ft.

INDIANA

Dubois County: Oil Electronics 1 Feldmeyer, SW SE SE 21-3s-5w. Dry. TD 2,763 ft.

Elkhart County: Calumet Oil Producers 1 Schuelke, NE SE SW 10-38n-4e. Dry. TD 771 ft.

Gibson County: A. W. Cherry 1 Epperson, SE NW NW 10-4s-11w. Dry. TD 2,558 ft.

Montgomery County: Ernest Zink 1 Kessler, SW SW SW 14-17n-3w. Dry. TD 2,131 ft.

Spencer County: I. C. Huff 1 Evert, SW NW NW 11-4s-4w. Dry. TD 558 ft.

WESTERN KENTUCKY

Hopkins County: Chenault & Basin Drilling Co. 1 Cardwell, SE NE NW 21-K-26. Dry. TD 2,625 ft.

MICHIGAN

Berrien County: Turner Petroleum Corp. 1 Haskins-Drach, SE SW NW 2-5s-17w. Dry. TD 828 ft. in Traverse lime.

Clare County: E. Edwin Brehm 1 Sisco, SW SW NW 33-17n-6w. Dry. TD 5,180 ft. in Richfield.

Montclam County: McClure Oil Co. 1 Spencer, SW SE NW 13-10n-5w. Dry. TD 3,214 ft. in Dundee.

Muskegon County: R. W. Devine and J. W. Lang Co. 1 Brown, SE NW SE 29-9n-15w. Dry. TD 1,843 ft. in Traverse lime.

Washtenaw County: Howard E. Fowler, Trustee 1 Read, SW NE SE 15-1s-7e. Dry. TD 4,729 ft. in Trenton-Black River.

OHIO

Holmes County: Seneca Oil Co. 1 J. M. Troyer, Sec. 16, Clark Township. Dry. TD 4,430 ft. in Clinton.

Summit County: New York Drilling Co. 1 M. Kearns, Lot 49, Northfield Township. Dry. TD 3,531 ft. in Clinton.

NEW YORK

Cattaraugus County: H. Brunt et al 1 J. W. Sharp, Randolph Quad. Sec. F. Dry. TD 4,677 ft. Show of gas 20 M.c.f. from Red Medina sand at 4,562 ft. Top 4,503 ft.

Chautauqua County: 1 Gerry Homes, Chautauqua Quad. Sec. C. IP 1,700 cu. ft. of gas per day, Red Medina sand 3,562 ft. Top 3,550 ft. TD 3,751 ft. (Gas well.)

PENNSYLVANIA

Indiana County, Pine Township: Fryer & Hanson, 1 Lucinda Mitchell, elevation 1,670 ft. Dry. Oriskany sand 8,169 ft. TD 8,199 ft.

WEST VIRGINIA

Randolph County, Middle Fork district: Washington Natural Gas Co. 2-4 E. S. Newlon heirs, elevation 2,126 ft., 1,154,000 cu. ft. gas, Gordon and Fifth sands, TD 1,587 ft.

Webster County, Glade district: Gregory Gas Co. 1 G. W. Miller, elevation 2,235 ft., 1,305,000 cu. ft. gas, Maxon sand 1,415 ft., TD 1,485 ft.

FLORIDA

Lee County: Sunnyland Contracting Co. 1 Walton, NW NW 13-45s-24e. Dry. TD 5,588 ft. Elev. 19 ft., chalk 5,495 ft.

MISSISSIPPI

Adams County: B. Serio and Punches Oil Co. 1 Sojourner estate, 12-5n-2w. Dry. TD 6,757 ft.

SOUTH LOUISIANA

Cameron Parish: Phillips Petroleum Co. 2-A State Lease 1436, Block 40, West Cameron area, Gulf of Mexico. Shut-in gas well, no gage, perforations 10,084-93 ft. TD 14,072 ft. (New field.)

Forest Oil Corp. 3 Miller, 29-15s-5w. IP 337 BOPD, 12/64-in., 39.6°, perforations 12,576-86 ft. TD 12,950 ft. (New pay and first oil production in Crab Lake field.)

Continental Oil Co. 2-A State Lease 1659, Block 194, West Cameron area, Gulf of Mexico. IP 61.5 BCPD and 4,177 M.c.f. daily, 16/64-in., perforations 8,490-8,543 ft. TD 9,300 ft. (New pay in West Cameron Block 192 field.)

Iberia Parish: Magnolia Petroleum Co. 1-D State Lease 842, Block 50, Eugene Island area, Gulf of Mexico. IP 2,290 M.c.f. daily, ⅜-in., dry, perforations 3,628-38 ft. TD 12,682 ft. (Extends, and new pay in Eugene Island Block 45 field.)

Iberville Parish: Lucerne Corp. 1 Wilbert, 60-9s-12e. Dry. TD 11,505 ft.

Jefferson Davis Parish: Bates & Cornell 1 Erwin, 4-8s-7w. Dry. TD 8,852 ft. (Tried to blow out—unable to regain circulation.)

Lafourche Parish: California Co. 8-I State Lease 1367, Block 3, Bay Marchand area, Gulf of Mexico. IP 199 BOPD, 16/64-in., 39.7°, perforations 5,200-34 ft. TD 5,620 ft. (New pay in Bay Marchand Block 2 field.)

Plaquemines Parish: Kerr-McGee Oil Industries, Inc., 1-B State Lease 1272, Block 52, Main Pass area, in Breton Sound. Dry. TD 6,200 ft.

California Co. 2 State Lease 1923, Township 23s-31e (Dixon Bay). IP 119 BOPD, 7/64-in., 33°, perforations 8,946-80 ft. TD 10,700 ft. (New pay in Dixon Bay field.)

Vermilion Parish: H. L. Hawkins 1 State Lease 2438, 32-11s-3w. Dry. TD 12,238 ft. (Stuck drill-pipe.)

NORTH LOUISIANA

Catahoula Parish: Justiss-Mears Oil Co., Serio-Punches Oil Co. 1 Justiss-Albritton, 27-7n-6e. Dry. TD 5,528 ft.

DeSoto Parish: Butler & Son Oil Co. 1 Billingsley, 35-12n-13w. Dry. TD 2,994 ft.

Grant Parish: Charles Barnett 1 Colfax Lumber & Creosote Co., 26-8n-5w. Dry. TD 920 ft.

LaSalle Parish: Hunt Oil Co. H-102 La. Delta Hardwood Lumber Co., Inc., 10-5n-4e. Dry. TD 6,002 ft.

Nebo Oil Co., Inc. 17 Nebo Fee, C SW NE 7-7n-3e. Dry. TD 4,268 ft.

Sabine Parish: Carl Turner 1 Mrs. Helen Hays Dew, 22-8n-11w. Dry. TD 2,410 ft.

Winn Parish: C. E. Simmons 1 Lizzie Parker, 36-13n-2w. Dry. TD 2,565 ft.

ARKANSAS

Lafayette County: Benedum-Trees Oil Co. 1 Tucker, C NW NE 5-20s-25w. Dry. TD 7,012 ft.

Arthur Richenthal 1 Moore, C SW NW 2-20s-26w. IPF 200 BOPD, Mitchell sand-Rodessa, 6,001-06 ft., 46°, ¾-in. TD 6,025 ft. (Northeast extension to Kiblah field).

Lonoke County: J. T. Layton 1 Roy Layton (Joe Plascan) Hole 3, C NE SE NW 17-2n-7w. Dry. TD 1,411 ft.

Nevada County: Smead Stuart and J. B. Warmack 2 Field, C E½ NW NW 14-14s-23w. Dry. TD 2,130 ft.

Union County: Weiser-Brown Oil Co. A-1 Pratt, C SW SW NE 29-18s-13w. Dry. TD 4,542 ft.

Ouachita County: Wilton H. Fair 1 W. H. Elson et al, C SW NE NE 32-14s-18w. Dry. TD 3,102 ft.

OKLAHOMA

Beaver County: Underwood 1 Just, C SE SE 14-2n-21eCM. Dry. TD 3,221 ft.

Cleveland County: Kewanee Oil Co. 1 Conley, NE NW SW 11-6n-1w. Dry. TD 7,430 ft.

Coal County: Stanolind Oil & Gas Co. 1 Skirvin, NW SE SW 20-2n-9e. Dry. TD 7,571 ft.

Garfield County: Davis Franseneta 1 Ladusau, NE SW SE 17-22n-3w. Dry. TD 2,569 ft.

Inland Oil Co. 1 Frickenschmidt, SW SW SW 20-22n-4w. Dry. TD 2,925 ft.

Garvin County: Texas Pacific Coal & Oil Co. 1 Joel West Farm "A," NW NW NW 26-4n-1e. Dry. TD 4,065 ft.

Grady County: Polk & Coyle-Goldsmith & Perkins 1 Smith, NE SE NE 18-3n-7w. Dry. TD 3,705 ft.

Vickers Petroleum Co. 1 Selzer, C NW SE 16-5n-5w. Dry. TD 11,059 ft. Caney 10,990 ft.

Greer County: Sherman McKown 1 Badek, NE NE NE 2-6n-22w. Dry. TD 835 ft.

Kay County: Cyclone Drilling Co. 1-A Chilocco, SE SE NE 22-29n-2e. Dry. TD 3,845 ft.

Kiowa County: Tom McCarty 1 Koeanke, S½ SW NW NW 5-6n-19w. Dry. TD 1,247 ft.

Lincoln County: Fryer & Hanson Drilling Co. et al 1 C. G. & C. Co., NW NE NW 2-12s-2e. Dry. TD 5,792 ft.

Logan County: Lang & Unger 1 Bowen, SE SE NW 15-15n-3w. Dry. TD 6,371 ft.

Murray County: Atmar Drilling Co. 1-A Butterley, SW NE SW 16-1n-2e. Dry. TD 2,281 ft.

Nowata County: Mark Weber 1 Browning, SW NE SW 11-26n-14e. Dry. TD 1,200 ft.

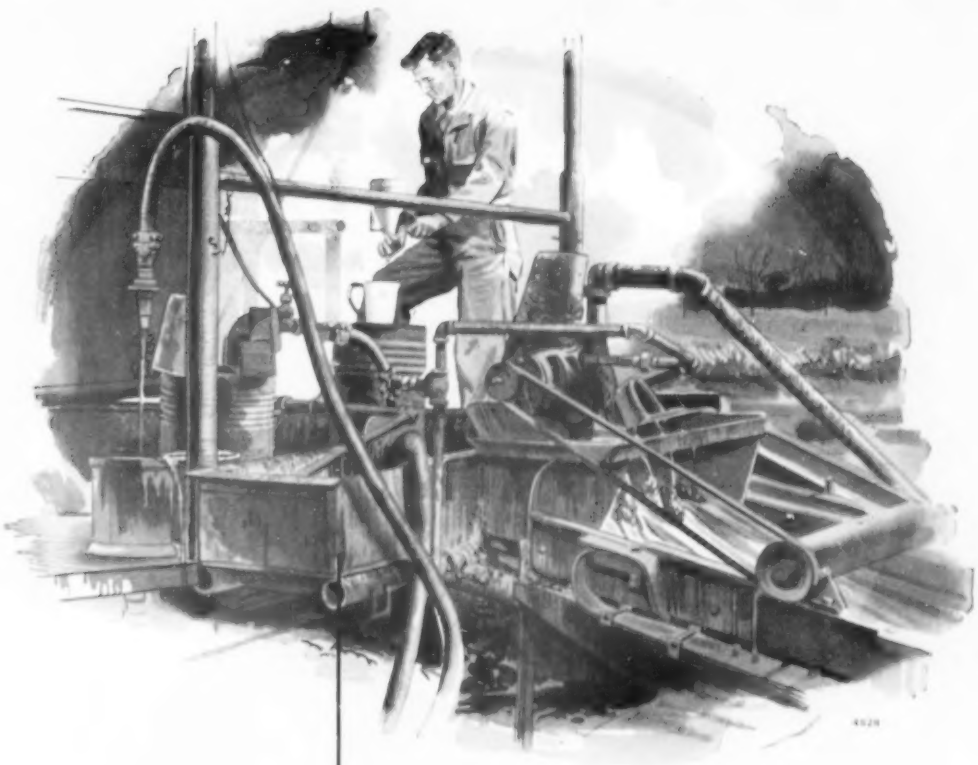
Okfuskee County: Mid-America Drilling Co. 1-A Carter, S½ SW NW 19-13n-9e. Dry. TD 4,231 ft.

Oklahoma County: N. V. Duncan 1 Lopp, SE NE NW 28-13n-1w. Dry. TD 6,349 ft.

Pottawatomie County: Paul C. Teas et al 1 Lee, NE SE SE 32-7n-3e. Dry. TD 3,234 ft.

Rogers County: Woodall & Bauer 1 Merritt, SW SE SE 33-21n-15e. Dry. TD 1,380 ft.

(Continued on page 194)



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Hospitality May Pay

Goff "discovers" Australia while entertaining friend

IF Gene Goff strikes oil at his rank wildcat in Australia, at least part of the credit must go to his southern-style hospitality.

Goff, a Tulsa drilling contractor and oil producer, was trying to entertain a guest when he was first bitten by the Australian oil bug.

That was in 1953, when Carmen Lombardo, brother of band leader Guy Lombardo, was in Tulsa for the International Petroleum Exposition. A geologist in Goff's office had seen a series of photographic slides showing geological formations in eastern Australia and had been trying to interest Goff in the possibility of finding oil there.

"I refused to look at it at first," says Goff. "I wasn't interested in foreign oil operations."

But, thinking his guest might enjoy seeing the slides, Goff invited Lombardo to view them in his office.

Although Goff has had no geological training and describes himself as "just a mule trader," he liked what he saw. Within days, he purchased controlling interest in Lucky Strike Drilling Co., which had obtained a concession on 3,648,000 acres in eastern Australia. Since then, Goff has made an on-the-spot inspection of the area, shipped a rig and staked location for a test which he hopes will make oil derricks as common there as kangaroos.

Lucky Strike's first Australian venture will be about 170 miles north of Brisbane and across the country from the recent Rough Range discovery. The location is about 200 miles from the nearest test, a dry hole drilled years ago.

Goff's knack for southern hospitality is not surprising since he was born in Arkansas—at Gillham, May 9, 1901.

Studied agriculture . . . His success in finding oil-producing strata is more perplexing. He attended the University of Arkansas, where he majored in agriculture. And he later attended Centenary College, Shreveport, La., where he majored in football. Still taking a lively interest in both farming and football, he spends nearly every weekend at his farm near Fayetteville, except during the football season when he roves from one big game to another.

Goff got his start in the oil business as a lease broker. He had already developed some skill as a salesman, first by wholesaling groceries (with his father) and later by selling hats.

It was during his hat-selling career, back in 1934, that Goff was enticed into the oil business. He was on a trip to Colorado when he ran across an old acquaintance and asked about several young oil men he had known in East Texas.

"I found out they all got rich," he says . . . "So that's why I decided to go into the oil business."

Started with $50 . . . Going back to East Texas "with $50 in my pocket," Goff started his brokerage business just in time to cash in on the Talco boom in 1936. With considerably more than $50, he returned to Arkansas and acquired about 3,500 acres where the Midway field soon was to be developed.

Now with production of his own, Goff "retired" in 1943 and settled down on his Arkansas farm.

The oil in his veins started bubbling again in 1948, when he visited the International Petroleum Exposition. He decided to go to West Texas and get a little royalty for his son, "Dash," now 14. Goff arrived in West Texas soon enough to drill one of the first major extensions in the fabulous Scurry County play. He stayed long enough to get an interest in several wells.

Goff later moved his headquarters to Tulsa "because it's the oil capital of the world, I guess, and closer to my farm."

He and his wife, Verna Lea, plan to leave for Australia the first week in November to watch progress of the first well there. Although he doesn't claim any scholastic knowledge of geological formations, he's exuberantly confident about his new venture.

The structure, he says, is more promising than any he's ever drilled, "and I've drilled quite a few of them."

Forest Woodside, former Gulf Oil Corp. geologist at Durango, has joined the staff of Big Horn-Powder River Oil, Denver.

Frank D. Potter, former staff valuation engineer with Sinclair Oil & Gas Co. in Tulsa, has been transferred to Denver as staff engineer.

H. G. Vesper has been named to direct marketing, supply, and transportation for Standard Oil Co. of Cali-

H. G. VESPER

A. L. LYMAN

fornia in the western area, including Alaska and Hawaii. Vesper, a vice president of California Standard since 1952, has been president of California Research Corp. for the past 8 years. **A. L. Lyman,** executive vice president of California Research, has been promoted to president to succeed Vesper.

E. J. Barth, former asphalt engineer with Gulf Oil Corp. at Pittsburgh, has resigned to open offices as a petroleum engineer and asphalt consultant in Newark, N. J.

C. F. Moore, Jr., former geophysicist with Sohio Petroleum Co. at Casper, Wyo., has been transferred to the Billings, Mont., office as a geophysicist. Moore replaces **N. W. McGee,** who has been transferred to the Regina, Sask., office.

Richard K. Scales has been named manager of Ethyl Corp.'s Detroit research laboratories, and **Dr. George F. Kirby** has been appointed general manager of research and engineering at Ethyl's Baton Rouge manufacturing plant.

Bettye M. Bohanon has been named treasurer and assistant secretary of Minnesota Pipe Line Co. Miss Bohanon has served in a variety of positions in the petroleum industry for nearly 25 years. For the past 5 years she has served as secretary and treasurer of

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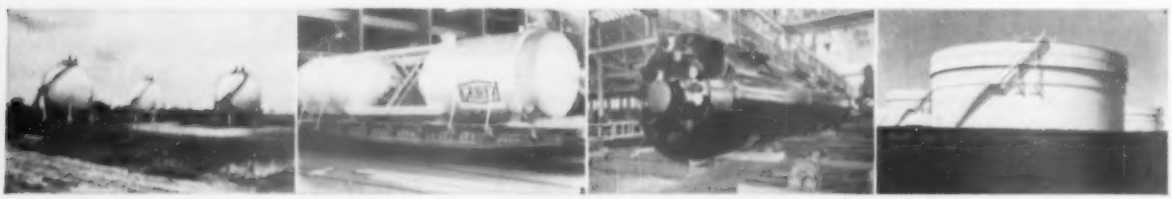

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PERSONALS

Conorada Petroleum Corp. in New York City, and has been associated with **Arthur A. Curtice,** petroleum consultant and former president of Conorada.

Paul N. Templeton has been named supervisor of tariffs and oil movements for Magnolia Pipe Line Co. and will

P. N. TEMPLETON

J. J. HARRIS

head a newly established oil-movements department for the company. Templeton will be assisted by **J. J. Harris,** formerly mechanical engineer at Dallas, who has been named coordinator of oil movements. Templeton, secertary of the company since 1948, earlier this year was named to the board of directors.

J. B. Cox has been transferred as a staff geologist by Southern Production Co. from the Midland, Tex., division office to the Fort Worth headquarters office.

Ralph Hughes, civil engineer for Sun Pipe Line Co., has been transferred from Corpus Christi to Snyder, Tex. **M. L. Sneed** has been transferred from Beaumont to Corpus Christi to replace Hughes.

W. F. Crooks has been promoted to vice president and treasurer of General Exploration Co. of Los Angeles. **R. S. Ballantyne, Jr.,** who has been associated with the firm as petroleum engineer, has been promoted to vice president.

G. B. Hubner, offshore coordinator for Atlantic Refining Co., has been transferred from Corpus Christi to Houston as part of a decentralization of Atlantic's operations. Others moving to the new Gulf Coast regional offices set up there are **Bruce Choate,** regional exploration manager from Dallas; **James L. Wilson,** regional operations manager from Corpus Christi; **J. B. Harrison,** regional petroleum engineer from Dallas; **B. F. Thomas,** regional drilling superintendent from Corpus Christi; **A. D. Dobbs,** regional materials supervisor from Tulsa; and **Claude Williams,** assistant regional landman from Dallas.

Paul R. Shultz has been named president of Blackwell Oil & Gas Co. in a complete reorganization of the firm's executive department. Before he was named to his new position, Schultz was associated with Stanolind Oil & Gas Co. in Tulsa. Schultz, confirming earlier rumors, said that the firm was transferring its offices from Cushing, Okla., to Tulsa.

William H. Myers, Jr., has been named associate reservoir engineer at Dallas by Atlantic Refining Co. Myers formerly was a reservoir engineer in the Tulsa office. Other Atlantic changes include: **Robert F. Owens,** promoted to senior drilling engineer at Tulsa; **James T. Lasford,** named senior drilling engineer at Duncan, Okla., succeeding **John S. Rhodes,** who has been transferred to Corpus Christi, Tex.; and **Richard G. Taylor, Jr.,** transferred from Duncan, Okla., to Aransas Pass, Tex., and promoted to production foreman.

M. C. HOFFMAN

M. C. Hoffman has been named division production superintendent at Calgary by Stanolind Oil & Gas Co. Hoffman is returning to Stanolind after several years of service with Root Petroleum Co. and Pan-Am Southern Corp., which recently disposed of most of its producing operations to Stanolind. **Sidney B. Richards,** who has been serving as petroleum-engineering supervisor for Stanolind at Tulsa, has been named division engineer. **C. O. Hopper,** district superintendent at Calgary, has been transferred to Edmonton to manage Stanolind's producing office there. **C. E. Dagley,** district clerk in Calgary since 1952, has been promoted to division clerk.

J. D. Ehl has been named superintendent of the newly created oil-manufacturing division of the refining division of Arabian American Oil Co. at Ras Tanura. Ehl also will serve as temporary superintendent of the new oil-handling department. Foremen in the two departments will be: **J. A. Engen,** crude distillation; **K. F. Maloney,** asphalt and stabilizer; **C. W. Wayman,** poly plant and reforming; **E. R. Johnson,** hydroforming; **C. F. Goodale,** treating; **H. L. Booth,** receiving and blending; **W. L. Brown,** wharf operation; and **H. D. Baker,** terminal oil handling. Night foremen of the oil manufacturing division will be **W. P. Daley, L. Mullen,** and **A. P. May.** The oil handling night foremen will be **R. F. Davis, E. M. Blackwell,** and **H. O. Perry.**

John S. Cruse has joined Arabian American Oil Co. in New York as a research geologist. Cruse formerly has been with Pure Oil Co. and Amerada Petroleum Corp.

Elster A. Smith has been promoted from engineer to assistant manager in the gas-supply department of the exploration and gas-supply division of Lone Star Gas and Lone Star Producing Co.

C. M. Foster has been transferred from Odessa, Tex., to Wichita Falls, Tex., by Gulf Oil Corp. as assistant zone superintendent of production. He held the same position at Odessa.

Henry Hofmann has been named assistant to the president of Tuscarora Pipe Line Co., Ltd., by the board of managers of the company. Hofmann, who has been with Tuscarora for more than 35 years, had been serving as manager and secretary-treasurer of the firm. **E. L. Ochs,** who has been with Tuscarora for more than 25 years, succeeds Hofmann. **G. Warren Miller** has been named assistant secretary and treasurer.

A. C. Wilkinson, vice president and general manager of Continental Pipe Line Co., has been promoted to the newly created position of senior vice president. **John L. Kelly,** former North Texas district superintendent, has been promoted to the newly established post of vice president in charge of opera-

A. C. WILKINSON

JOHN L. KELLY

tions. Other promotions announced by Continental are: **John D. Morrow,** administrative assistant to the president, promoted to coordinator and assistant to the president; **F. C. Whiteside,** chief engineer, advanced to manager of development and technical advisor; **William K. Burns,** senior office engineer,

PERSONALS

promoted to chief engineer; **Earl B. Webster,** assistant to the vice president and general manager, advanced to supervisor of oil movements; **C. Jay Plett,** chief clerk, named supervisor of industrial relations; and **R. L. Sanders,** office manager for Yellowstone Pipe Line Co., named chief clerk for Continental.

John M. Clevenger has been moved from Big Spring to Midland, Tex., by Sinclair Oil & Gas Co. Clevenger, district superintendent, was transferred when Sinclair moved its district production office from Big Spring to Midland.

Richard L. O'Shields is the new field supervisor at Leeville, La., for Latex Gulf Oil Co. He formerly was sales director for Salt Water Control, Fort Worth.

James W. Foley and **A. Neil Lilley,** vice presidents of The Texas Co., have been elected to the board of directors.

J. W. FOLEY

A. N. LILLEY

Foley joined the company in 1932 and has held several positions in the engineering and production departments. He was elected a vice president in February, 1953. Lilley joined Texaco in 1933 and was elected vice president in charge of the foreign operations department, Eastern Hemisphere, in December 1951.

L. E. Sharver has been promoted from chief clerk to chief dispatcher at Magnolia Pipe Line Co.'s Beaumont office, which is handling the Beaumont-Hebert-Houston-Hearne products formerly handled by Texas Pipe Line Co. from Houston. **John F. Slice** has been transferred from the Dallas crude-oil dispatching office and promoted to scheduler. **John Fisk** and **Elmer Jones,** relay operators at Beaumont, have been promoted to dispatchers. **Fred M. Springer,** field gager at Sweetwater, Tex., has been transferred to Beaumont and promoted to dispatcher. **A. B. Hogan,** a dispatcher with Texas Pipe Line at Houston, has been transferred to Beaumont.

I.N.G.A.A. Elects Officers For 1954-55

Chosen to head the Independent Natural Gas Association of America for the 1954-55 year at the recent annual meeting are (left to right): J. J. Hedrick, president of Natural Gas Pipeline Co. of America, Chicago; J. F. Merriam, president of Northern Natural Gas Co., Omaha; and Glenn W. Clark, president of Cities Service Gas Co., Oklahoma City.

Homer Z. Martin, assistant director of the development division of Standard Oil Development Co., has been transferred to the research division as assistant director. **Arnold Kaulakis** and **Henry J. Ogorzaly** will assume Martin's former duties.

Horace N. Goodell has been appointed manager of exploration for Cyprus Oil of Los Angeles. He will head new offices being opened in Houston. Goodell formerly was a Denver consulting geologist.

Calvin T. Thomas has been named manager of the transportation department of General Petroleum Corp. Thomas had been manager of automotive equipment for the marketing department since 1948.

R. C. Barbour, Jr., gas engineer at the Katy gas-cycling plant of Humble Oil & Refining Co., has been named a petroleum engineer and transferred to the Athens district. **Billy W. Evans,** petroleum engineer, London district, has been transferred to the cycling plant as a gas engineer. **Donald D. Cherry,** civil engineer, has been transferred from the North Texas division office to the East Texas division office.

Dale E. Doty, former assistant secretary of the Department of Interior and recently a member of the Federal Power Commission, has joined the law firm of Doerner, Rinehart, Stuart & Clammer. **Norman E. Duke,** former attorney on the legal staff of the FPC and former assistant to the chairman of the FPC, also has joined the firm which maintains offices both in Tulsa and Washington.

M. M. Mulholland, former district geologist with Carter Oil Co. at Grand Rapids, Mich., has been promoted to staff assistant at Mattoon, Ill.

Robert M. Robinson has joined the gulf marine department of Continental Oil Co. at Algiers, La., as a corrosion engineer. Robinson had served previously with Shell Oil Co. as a corrosion engineer at Tulsa.

James W. Nance has resigned his position as chief geologist for Pioneer Oil Corp. and Shannon Oil Co. to open consulting offices in Denver. Before joining Pioneer in 1951, Nance was associated with Creole Petroleum Corp. for 8 years and for 5 years was senior geologist for Carter Oil Co. in the Rocky Mountain area.

R. C. Barbour, Jr., gas engineer at the Katy gas cycling plant, has been transferred to Athens district, East Texas division, as petroleum engineer by Humble Oil & Refining Co. Other Humble changes are: **Billy W. Evans,** petroleum engineer, London district, East Texas division, transferred to Katy gas cycling plant as gas engineer; **Donald D. Cherry,** civil engineer, North Texas division office, transferred to East Texas division as civil engineer; and **A. E. Petty,** bottom-hole pressure operator, East Texas division office, promoted to farm boss in Palestine, Tex., district.

PERSONALS

Joseph McCoy will become a consulting geologist with offices in Denver. He recently resigned as division geologist in Denver for Sinclair Oil & Gas Co.

A. E. Benson has been promoted to assistant supervisor by Amerada Petroleum Corp., moving from Craig, Colo., to Casper, Wyo. Benson was party chief at Craig.

George N. Ely, division geologist for Continental Oil Co. at Tyler, Tex., has been transferred to Billings, Mont., where he also will serve as division geologist.

P. H. DuVal has been elected vice president of Arkansas Fuel Oil Corp. DuVal has been vice president and general manager of Arkansas Pipeline Corp., a subsidiary of Arkansas Fuel, since 1943 and has been serving also as manager of crude-oil and gas purchases and sales of Arkansas Fuel. DuVal has been with the Arkansas companies since 1929.

John R. Leonard has been promoted to division geologist of the Panhandle area by Phillips Petroleum Co. He formerly was a staff geologist of the Northwest division.

Richard F. Lemon has joined El Paso Natural Gas Co. as a reservoir engineer at Houston. He moved to El Paso from Stanolind Oil & Gas Co. He was a petroleum engineer at Lubbock, Tex., while with Stanolind.

A. T. Milbrook has been appointed chief engineer of the utilities engineering division in the new engineering department established by Standard Oil Co. (Ind.) at Whiting. Milbrook's appointment is one of 25 made in the new department. Other chief engineers are: **W. K. Brown,** construction and estimating; **H. M. Romig,** process engineering; **W. R. Burrows,** special services; **Benjamin Franklin,** contracts; and **Sloan Haworth,** coordinating and administrative. New head engineers at Whiting are **F. B. Brueckman, F. A. Upson, J. C. Howard, K. C. Lowe, W. W. Bond,** and **J. W. Cooper. R. R. Penman** has been named assistant chief engineer in special services and **K. L. Carter** assistant chief engineer in the still and hydraulic department. **C. E. Dyckman** is assistant chief engineer in the estimating department. Assistant head engineers who have been appointed are **C. L. Rank, G. A. Erickson, E. C. Hamman, Jr., G. A. Hankins, R. V. Nutt, C. A. Olson, A. C. Sampson, D. F. Sands, C. L. Swift, and H. G. Kabbes.**

C. W. Corbett has been named manager of the land and geological department in the Denver division by Phillips Petroleum Co. **A. Haig** has been named assistant division manager and division geologist.

George L. Gore has been promoted to petroleum engineer by Dowell Incorporated, and transferred from Tulsa to Denver. Gore joined Dowell in 1949 as a junior service engineer shortly after his graduation from Oklahoma A. & M. College.

Robert W. Verkins has been transferred by Carter Oil Co. from Tulsa to Billings, Mont. Verkins is chief scout of the northern division at Billings. He was a district scout at Tulsa.

M. J. Dabney, former employe of Plantation Pipe Line Co., in Atlanta, has been appointed to the newly created position of coordinator of pipeline research by Standard Oil Development Co.

C. Hanford Drummond has been appointed chief geologist in the Rocky Mountain division by Union Oil Co. of California. Drummond is moving from Union's Calgary office. He succeeds **J. H. McCourt,** who has been appointed exploitation geologist with headquarters in Cut Bank, Mont.

Jerome J. O'Brien has been named vice president in charge of Monterey Oil Co.'s new Mid-Continent division offices in San Antonio. **E. L. Earl** has been named to manage the firm's Louisiana headquarters in Louisiana. **H. E. Menger** has been named division geologist of the Mid-Continent division. The changes were effective September 1, when the merger of Monterey Oil Co. with its wholly owned subsidiary, Monterey Exploration Co., became effective.

Elmer L. Herbaly, a geologist for Gulf Oil Corp., has been transferred from Oklahoma City to Ardmore, Okla.

Charles W. Guy has been named vice president of Texas Natural Gasoline Corp., Tulsa. Guy had been serving as executive vice president of General Gas Corp., of Baton Rouge, La. Guy is a member of the board of directors of Liquefied Petroleum Gas Association.

C. G. Horner has joined Aurora Gasoline Co. as assistant superintendent at Muskegon, Mich. He formerly was supervisor for Sunray Oil Co. at Duncan, Okla.

Victor C. Eissler has been transferred from Big Spring, Tex., to Denver City, Tex., by Continental Oil Co. Eissler is a petroleum engineer.

R. F. Higginbotham has been named district superintendent at Odessa, Tex., for Sinclair Oil & Gas Co. He formerly held a similar position with Sinclair at Columbus, Tex.

DEATHS

James H. Murren, 78, chief oil dispatcher for Sinclair Pipe Line Co. at Kansas City from 1917 until his retirement in 1942, died recently at his home in Kansas City.

Charles C. French, Jr., 59, independent with operations mostly in West Texas, died in Fort Worth recently.

Col. John H. Leavell, 71, Tulsa independent operator, died recently in Honolulu, Hawaii, while on vacation. Leavell served as an officer in both World War I and World War II. During the latter, he was petroleum attache to the American legation in Egypt. Burial was in Arlington National Cemetery at Arlington, Va.

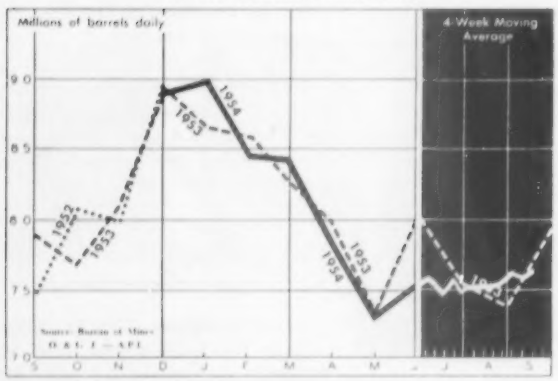
Gerald B. Rusk, superintendent of production for Hancock Oil Co. and a prominent developer of Signal Hill field, died September 19 following an illness of several months. Rusk began work at Signal Hill more than 32 years ago as a roughneck.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,196,050	UP	21,250	DOWN	349,772
Crude stocks	273,337,000	DOWN	1,500,000	DOWN	7,528,000
Completions	918	DOWN	163	DOWN	45
Refinery runs	6,969,000	DOWN	20,000	DOWN	23,000
Gasoline stocks	151,787,000	DOWN	1,492,000	UP	10,139,000
Four-product stocks	370,720,000	UP	2,265,000	UP	14,237,000
Total imports	874,000	DOWN	164,000	DOWN	214,200

TOTAL DEMAND – ALL OILS



Abnormal Spreads Between Spot and Tank-Wagon Prices Cause Price Wars

FAILURE of leading marketers to follow the spot market with reductions in tank-wagon prices is a major factor back of the big increase in the number of service-station price wars in recent months.

When crude prices increased 25 cents a barrel on June 15, 1953, it was normal for product prices to reflect this higher cost of raw material. Spot quotations for Group 3 gasoline moved up 1.0 cent a gallon, but tank-wagon prices in some areas, served by Group 3 refiners, increased only about 0.5 cent a gallon. Tank-wagon prices in other areas increased the full cent a gallon.

The varying increases at the tank-wagon level, representing adjustments for local conditions, tended to bring tank-wagon prices in line with the spot market.

Unbalanced markets . . . Since the time of the product price rise in June 1953, the Mid-Continent gasoline market has continued to lose strength. Group 3 gasoline is now selling on the spot market for less than it did before the crude-price increase last year. The cargo price for gasoline on the Gulf Coast is 0.25 cent less than it was before the increase, and the barge price in New York Harbor has also dropped below the level of June 1953.

Some price reductions have been announced for tank-wagon deliveries of gasoline in areas on the East Coast, but very few cuts had been made in the Mid-Continent and North Central states until about September 20.

Some Mid-Continent refiners have continued spot postings of 10.75 cents plus pipeline charges for regular gasoline, but have made spot sales as low as 10.0 cents plus pipeline costs.

The increasing spread between spot prices and contract prices has caused more and more jobbers to buy larger percentages of their total requirements on the spot market.

As long as tank-wagon and service-station prices remained reasonably firm, the jobber had a bigger margin on the material bought on the spot market. Some of this margin was given to service-station operators as the jobber worked for new business.

In turn, the service-station dealer gave away enough of his margin and gained enough new business to attract the attention of competition. A price war was the end result.

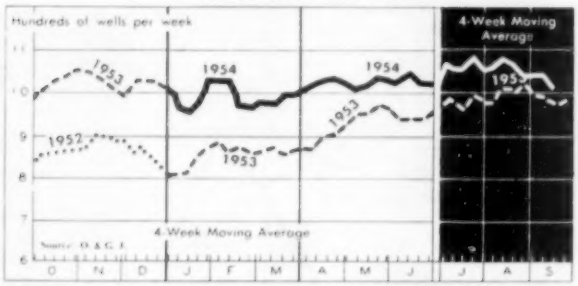
Current reports indicate that some suppliers are now granting temporary discounts to brand jobbers, bringing prices to this class of customers more in line with spot prices.

If price cutting and price wars continue, the next step will be general reductions in tank-wagon postings.

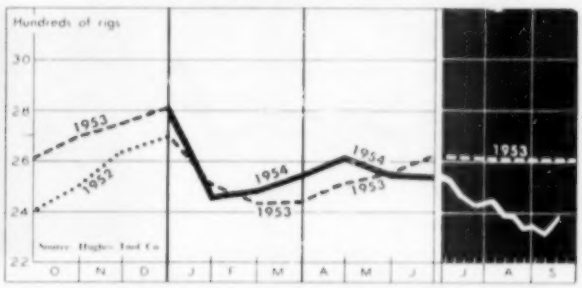
Market tone . . . Cooler weather in the northern states and the announced reduction in Texas production allowables for October have combined to give the fuel market a slightly better tone.

No immediate increases in fuel prices are expected, but the reduction in the amount of distillate going to storage and the possibility of lower refinery runs have given promise of a slightly brighter picture for the winter months.

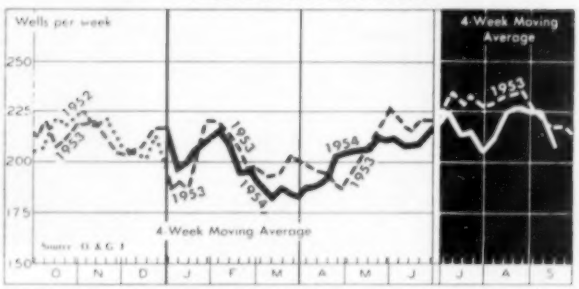
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

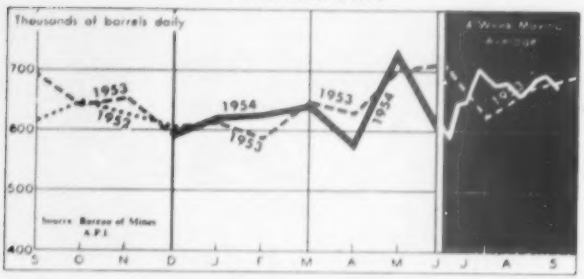
Area—	9-20-54	Change from 9-13-54	Change from 9-21-53
Gulf Coast	513	35	— 20
N. and W. Texas-New Mexico	733	15	— 61
Arkansas-N. Louisiana-E. Texas	187		— 6
Oklahoma	282	1	— 76
Kansas-S. Nebraska	164	10	13
Illinois-Eastern	148	1	— 2
Rocky Mountain	245	14	— 19
Pacific Coast	126	— 1	— 48
Total United States	2,398	75	—219
Western Canada	121	5	— 61

WEEKLY WELL COMPLETIONS . . . WEEK ENDED SEPTEMBER 18, 1954

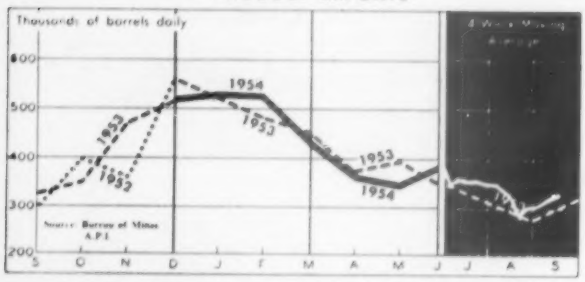
	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1954				
	Comp.	Oil	Gas	Dry	Footage	1954	1953	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	1	0	0	1	5,588	80	105	0	0	0	1	1	2	0	2	69	73
Arkansas	16	8	0	8	60,868	455	376	1	0	0	5	6	20	0	4	88	112
California	31	21	1	9	163,734	1,695	1,851	3	0	0	7	10	45	1	9	374	429
Colorado	22	8	0	14	112,811	939	499	2	0	0	10	12	27	0	14	378	419
Illinois	76	47	0	29	175,110	2,012	1,382	0	0	0	0	0	8	0	0	233	241
Indiana	15	5	0	10	23,446	564	937	0	0	0	5	5	7	0	0	101	108
Kansas	77	37	7	33	273,955	3,271	3,510	1	0	1	13	15	58	0	16	435	509
Kentucky	26	12	6	8	52,432	801	791	0	0	0	2	2	13	0	3	81	97
Louisiana	84	55	5	23	464,683	2,526	1,896	3	1	2	11	17	81	42	29	252	404
North	52	34	2	16	142,517	1,383	798	0	0	0	7	7	11	3	11	103	128
South	32	21	4	7	322,166	1,143	1,098	3	1	2	4	10	70	39	18	149	276
Michigan	13	5	0	8	37,589	403	423	0	0	0	5	5	13	0	0	150	163
Mississippi	5	1	0	4	32,527	291	263	0	0	0	1	1	8	1	0	101	110
Montana	9	1	0	8	40,487	226	298	0	0	0	5	5	3	0	1	72	76
Nebraska	8	6	0	2	44,868	303	246	1	0	0	0	1	18	0	3	90	111
New Mexico	15	8	7	0	59,705	785	1,001	0	0	0	0	0	13	0	15	81	109
North Dakota	4	2	0	2	31,131	210	188	0	0	0	2	2	4	0	0	79	83
Ohio	19	8	5	6	36,215	824	756	0	0	0	2	2	3	0	4	13	20
Oklahoma	142	82	6	54	466,446	6,582	5,314	0	0	0	19	19	83	3	18	483	587
Pennsylvania-New York	45	14	15	*16	87,770	1,696	1,863	0	0	1	2	3	0	0	6	30	36
Texas	289	173	17	99	1,293,802	13,309	12,332	6	0	5	48	59	584	54	130	3,026	3,794
Southwest (1 & 4)	55	30	4	21	227,123	1,920	1,994	1	0	4	11	16	82	24	37	524	667
Gulf Coast (2 & 3)	47	23	3	21	304,704	1,928	1,808	0	0	1	15	16	61	25	39	486	611
East (5 & 6)	11	4	5	2	68,590	687	571	0	0	0	1	1	12	0	13	206	231
North Central (7-B & 9)	117	58	5	54	370,898	4,980	4,673	4	0	0	21	25	267	4	16	1,218	1,505
West (7-C & 8)	47	46	0	1	279,860	3,070	2,720	0	0	0	0	0	159	0	17	527	703
Panhandle (10)	12	12	0	0	42,627	724	566	1	0	0	0	1	3	1	8	65	77
Utah	0	0	0	0	0	51	50	0	0	0	0	0	3	0	1	27	31
West Virginia	7	2	4	1	16,026	418	436	0	0	2	0	2	0	0	22	13	35
Wyoming	13	8	0	5	75,712	928	523	0	0	0	5	5	29	0	6	141	176
Miscellaneous (S. D.)	1	0	0	1	3,994	93	59	0	0	0	1	1	2	0	0	25	27
Total United States	**918**	503	74	341	3,558,899	38,462	35,099	17	1	11	144	**173**	1,024	101	283	6,342	7,750
Total previous week	1,081	567	104	410	4,192,268			23	4	4	201	232	1,007	100	272	6,198	7,577
Total September 19, 1953	963	516	51	396	3,955,693			34	3	3	201	241	1,058	76	273	6,573	7,980

Service wells included: *13.

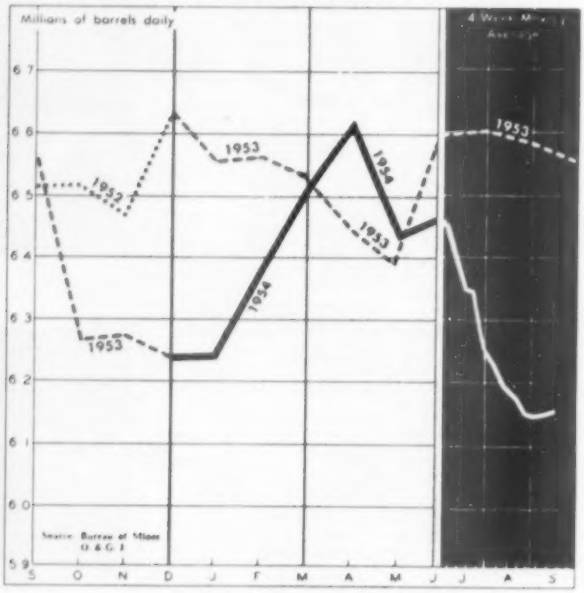
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION



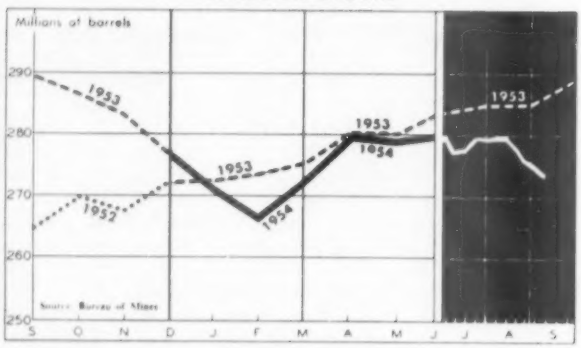
DAILY AVERAGE PRODUCTION FOR WEEK

	September 18			Sept. 11
	Crude oil	Lease condensate	Total	total
Alabama	4,100		4,100	4,000
Arkansas	76,300	450	76,750	77,500
California	962,000		962,000	965,500
Colorado	128,100		128,100	124,500
Eastern	55,200		55,200	55,200
Florida	1,500		1,500	1,500
Illinois	182,700		182,700	182,200
Indiana	27,500		27,500	27,900
Kansas	318,200		318,200	318,900
Kentucky	36,700		36,700	37,300
Louisiana	584,750	40,600	625,350	623,350
North	109,100	2,600	111,700	109,700
South	475,650	38,000	513,650	513,650
Michigan	32,400		32,400	30,500
Mississippi	87,000	3,400	90,400	90,500
Montana	41,900		41,900	42,300
Nebraska	19,200		19,200	18,900
New Mexico	205,300	1,650	206,950	206,650
Oklahoma	505,200		505,200	488,500
Texas	2,564,200	45,500	2,609,700	2,609,700
Dist. 1	41,900	400	42,300	42,300
Dist. 2	128,700	6,050	134,750	134,750
Dist. 3	404,000	22,200	426,200	426,200
Dist. 4	225,600	5,200	230,800	230,800
Dist. 5	43,500	350	43,850	43,850
Dist. 6	109,000	4,600	113,600	113,600
East Texas field	209,500		209,500	209,500
Dist. 7-B	134,000	25	134,025	134,025
Dist. 7-C	172,000	4,500	176,500	176,500
Dist. 8	831,000	1,900	832,900	832,900
Dist. 9	181,000	250	181,250	181,250
Dist. 10	84,000	25	84,025	84,025
Utah	4,300		4,300	4,100
Wyoming	253,200		253,200	251,700
North Dakota	‡14,700		‡14,700	‡14,100
Total U. S.	6,104,450	91,600	**6,196,050**	6,174,800
Change from previous week, up			**21,250**	
Canada	†313,450		†313,450	†230,575

Total U. S. production January 1 September 18 1,659,837,400 bbl.
Same period last year (crude plus cond.) *1,705,991,710 bbl.

*Includes 23,689,150 bbl. condensate. †Week ended previous Monday. ‡Includes S. D. 100 bbl.

CRUDE-OIL STOCKS



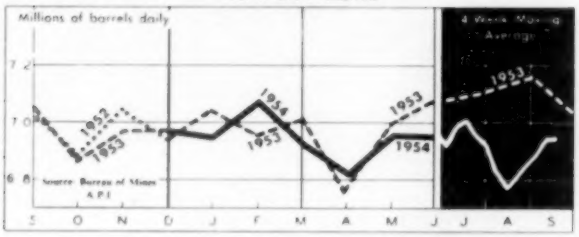
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

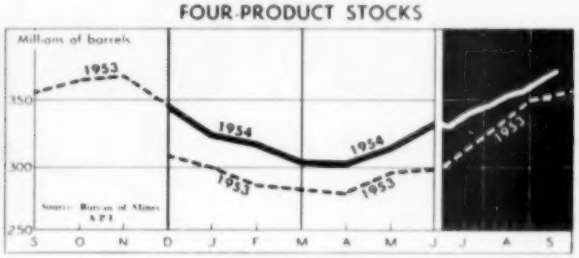
	Sept. 11, '54	Sept. 4, '54	Sept. 12, '53
Pennsylvania Grade	3,045	3,059	2,749
Other Appalachian	1,526	1,699	2,411
Illinois, Indiana, Michigan	12,224	12,548	11,780
Kansas	9,991	9,866	10,005
Oklahoma	24,408	24,456	31,284
Arkansas	3,207	3,214	2,924
Louisiana	15,526	15,861	16,955
North	2,593	2,574	2,760
Gulf	12,933	13,287	14,195
Mississippi	2,803	2,793	3,583
New Mexico	8,692	8,841	8,654
Texas	129,668	130,270	130,852
East Texas proper	10,867	11,016	11,062
West Texas	57,409	58,120	58,330
Texas Gulf	26,135	26,183	27,985
Other Texas	35,257	34,951	33,475
Wyoming	12,316	13,002	13,788
Other Rocky Mountain	5,835	5,193	3,048
California	33,207	33,314	31,506
Foreign	†10,889	10,721	11,326
Total	273,337	274,837	280,865

*Bureau of Mines. †Includes 3,115,000 bbl. in California.

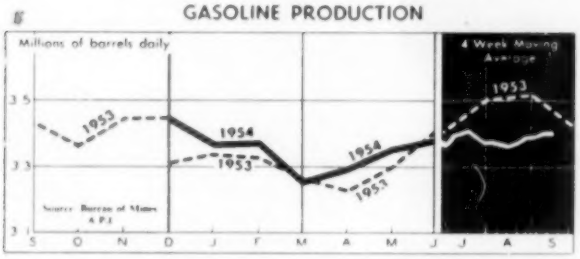
REFINERY RUNS



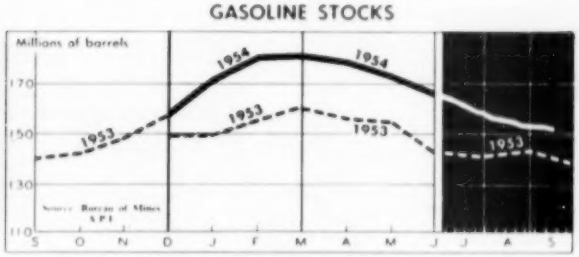
FOUR-PRODUCT STOCKS



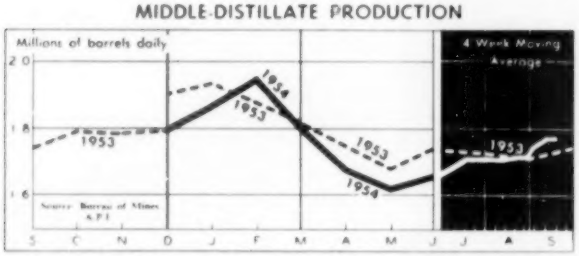
GASOLINE PRODUCTION



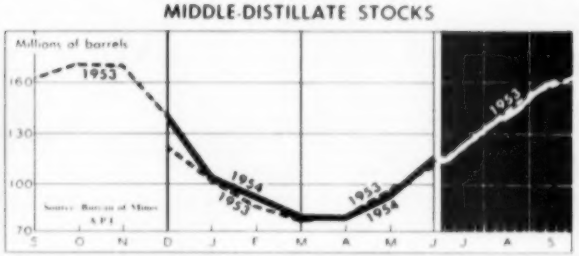
GASOLINE STOCKS



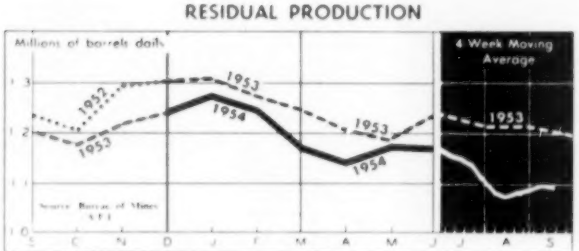
MIDDLE-DISTILLATE PRODUCTION



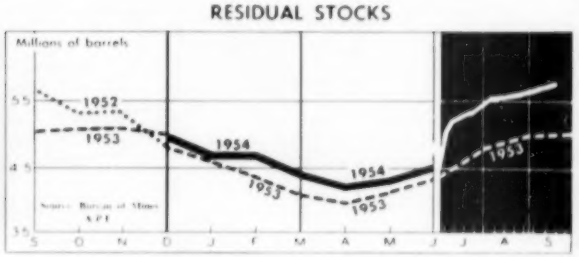
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, SEPTEMBER 17

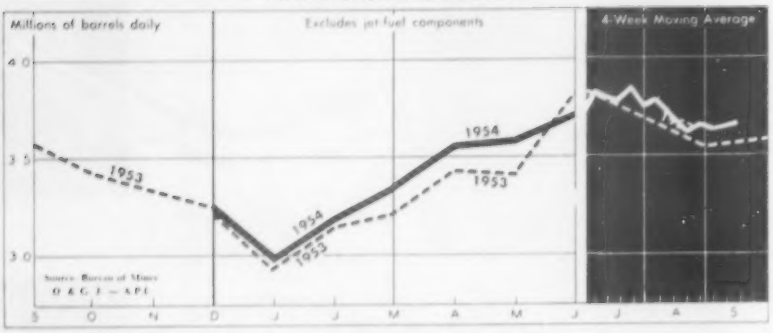
(Excludes all jet-fuel components)

(Thousands of barrels)

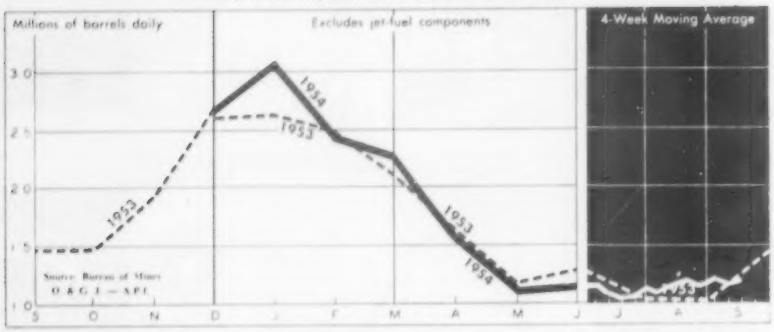
District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks† Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, September 1953 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	983	432.0	36.2	239.4	182.7	34,601	15,041	44,303	11,142	1,052	420.8	35.2	249.6	227.9
Appalachian:														
District 1	115	51.4	4.0	27.6	9.4	4,142	648	2,083	465	107	46.1	5.0	20.4	11.3
District 2	67	29.0	1.3	8.6	6.0	2,273	443	733	297	85	48.5	5.3	12.6	11.1
Ind., Ill., Ky.	1,219	677.1	74.7	227.4	137.3	34,319	9,615	25,045	4,759	1,278	717.1	71.3	218.9	166.7
Okla., Kans., Mo.	596	339.1	18.4	137.3	40.7	14,561	2,419	12,903	1,188	583	353.9	17.7	134.9	45.0
Inland Texas	233	171.9	6.1	44.4	23.1	5,329	371	2,329	1,300	239	179.8	10.4	44.4	29.9
Texas Gulf Coast	1,739	787.1	107.4	402.7	238.9	19,801	4,526	14,479	7,244	1,691	835.3	118.3	398.1	238.8
La. Gulf Coast	569	312.0	65.7	152.6	37.3	8,459	3,043	4,960	1,339	546	280.9	51.1	138.9	43.2
N. La. and Ark.	91	35.6	8.4	19.4	5.6	3,958	936	1,470	134	86	35.9	6.8	19.1	6.4
Rocky Mountain:														
New Mexico	19	12.0	0.3	3.0	2.9	257		83	35	18	11.3	0.4	3.0	2.9
Other Rocky Mtn.	259	124.6	3.7	59.0	40.7	5,878	236	2,797	860	259	125.3	3.3	54.8	42.0
California	1,079	435.6	4.2	113.9	376.4	18,209	366	12,836	28,505	1,079	466.3	5.1	153.1	378.1
Sept. 17, 1954	6,969	3,407.4	330.4	1,435.3	1,101.0	151,787	37,644	124,021	57,268	7,023	3,521.2	329.9	1,447.8	1,203.3
Sept. 10, 1954	6,989	3,420.0	351.6	1,442.3	1,102.6	153,279	36,717	121,734	56,725					
Sept. 19, 1953	6,992	3,436.7	285.4	1,389.0	1,218.4	141,648	36,822	125,849	52,164					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

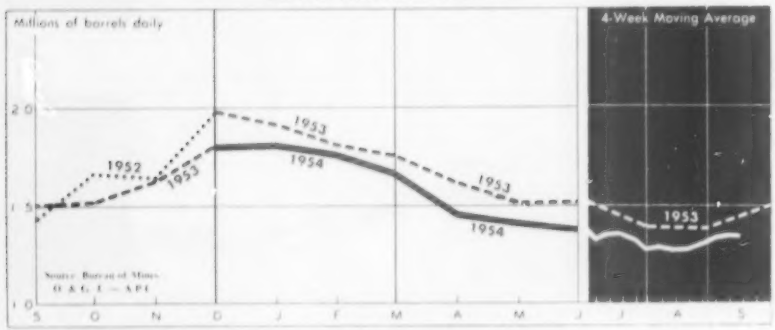
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of September 22, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.25-11	11.25-12	10.50-10.75
Premium gasoline	11.25-12	13-13.75	11.50-11.75
42-44 w.w. kerosine	9-9.25	9.70-9.95	8.75-9
No. 2 straw fuel oil	8.25-8.5	8.95-9.2	8.25-8.5
No. 6 residual	$1.20-1.25	$2.10-2.25	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.0	4.5	4.75
Grade 18-55	6.0	5.5	5.75

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX
Mid-Continent

132-134 A.M.P.	6.0

• Some additional recognition is being given to low spot gasoline prices in areas supplied by Group 3 refiners. Some suppliers are reported to be giving temporary discounts on gasoline to brand jobbers in some of the North Central states. Group 3 spot gasoline market is still weak.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 9-17-54	3,404	3,643
June 1954	3,379	3,894
August 1953	3,517	3,544
September 1953	3,432	3,579
Middle distillate:		
Four weeks ended 9-17-54	1,777	1,209
June 1954	1,705	1,159
August 1953	1,724	1,031
September 1953	1,745	1,453
Residual fuel:		
Four weeks ended 9-17-54	1,092	1,351
June 1954	1,123	1,349
August 1953	1,222	1,411
September 1953	1,203	1,498

CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.*	Okla-homa, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

Effective dates: California, February 16, 1953; east of California, June 15, 1953; Pennsylvania Grade, September 1, 1954.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.00-3.23
Middle District	3.15
Southwest Pennsylvania	2.81
West Virginia	2.70
Ohio	2.74
Illinois Basin	2.90-3.02

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FOR SALE EQUIPMENT

WILSON ATLAS. Sales Price—$21,000.00. Equipped with two L1-600 Cummins Diesel Engines in good condition: includes pump drive, 12 PD groove sheave and V-belts. One American cathead and one plain spool cathead. Compound enclosed oil-bath. Includes one 1000 gal. fuel tank. Contact Cardwell, Houston.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE
NEW DRILL PIPE

185 joints (Approximately 5,550') of new 3½" OD 13.30# Grade D Spang External Upset, Internal Flush drill pipe. Equipped with 5" OD Spang Double Seal Shrink Thread Internal Flush Tool Joints. Range 2. Location—Oklahoma City. Price —$388.84 per 100', plus sales tax.

Contact Gentry.

Phillips Petroleum Company
Bartlesville, Oklahoma.
Call LD 25—Ext. 200.

PLANT LIQUIDATION

8—Stainless steel columns: 8' x 61', 7' x 25', 6' x 64', 6' x 45' 850#, 4' x 110', 4' x 70', 2' x 73', 2' x 39'.
9—Steel columns 7'6" x 56', 7' x 42', 7' x 5', x 70', 6' x 63', 5' x 62', 4' x 72', 3'6" x 63', 2'6" x 60', 2' x 75'.
2—1440 sq. ft. 304 SS exchangers.
2—1125 sq. ft. steel heat exchangers, 850#.
9—Kettle type reboilers, steel & SS 1250, 1125, 750, 660, 400 & 340 sq. ft.
58—Atmosphere heat exchanger units, 304 SS, 715, 477, 358 & 108 sq. ft.
60—Turbine driven centrifugal pumps, SS & Steel, 1" x 1" to 8" x 8".
2—6-stage Pacific pumps 730 GPM.
2—Clark MA-4 150 BHP engines.
2—Union Iron Works 30,000#/hr. water-tube boilers 240 PSI complete.
2—Oliver 8' x 10' Rot VAC Filters.
Bird 36" x 50" Centrifuge.
5' x 12', 4' x 6' Drum Flakers.

Detailed circular upon request.

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Sell us your surplus equipment

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SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

ROTARY RIG COMPLETE: 2,500 to 5,000 ft. capacity. Easily Portable. 4½-in. drill pipe. Double derrick, 7-ft. substructure, Model "S" Cardwell drawworks, 14-in. Gardner-Denver pump powered by LRO Waukesha. Located near Sterling, Colo. R. V. Dillard, Phone 1177 or write Box 992, Duncan, Okla.

FOR SALE

VALVES

A complete line of reconditioned & tested steel & cast iron

GATE VALVES

"Like new" performance. Guaranteed at substantial savings.

Hudson Pipe & Supply Co.
Ft. of E. 33rd St.
Bayonne, New Jersey
Federal 9-1811

FOR SALE

INGERSOLL-RAND
GAS ENGINE DRIVEN COMPRESSOR

1— XVG-8 —350 H.P.

Now equipped with LP compressor cylinders. In daily operation in large industrial plant to be electrified.

Excellent Condition
Low Price

EARL E. KNOX COMPANY
TELEPHONE: 2-5204
BACON STREET, ERIE, PA.

FOR SALE EQUIPMENT

FOR SALE: Sullivan 200 complete with all tools ready to work. Located Tulsa, Okla. Contact R. F. Mesker, Phone 6-0057 or 5-9357, Tulsa.

FOR SALE—TD-18 International Dozer with 12' blade. Good condition and ready to go. Located near Artesia, New Mexico. $5,000.00. Contact Malco Pipeline Company, Inc., Attention, F. E. Smith, Box 660, Roswell, New Mexico.

ONE MODEL K Cardwell Spudder, fully equipped, excellent condition, operating in tri-state area. For further information write Box H-263, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126 Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

WELL DRILLING EQUIPMENT. New and used spudders, rotaries, core drills. Tools, pipe, cable. Everything for well drilling. Fishing tools rented. Pressey & Son, Pueblo, Colo.

U-15 WITH hydromatic brakes, powered by four 250 Horse Power Cummins diesel engines through hydraulic couplings with 127' Lee C. Moore mast, 4½" drill pipe, 6¼" drill collars. Oilwell 14P pump, mechanical Shaffer double BOP and all accessories for complete rig. First class operating condition. Rocky Mountains. Inventory on request. Box H-405, The Oil and Gas Journal, Tulsa, Oklahoma.

GASOLINE PLANT *FOR SALE*

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

FOR SALE
EMSCO GB 800 RIG

This rig fully equipped with many extras. Less than 45,000' of hole drilled with rig and accessories since new. Inventory includes grooved drum, dynamatic brake, heavy duty mast, 12 foot substructure, 2 pumps including Gardner-Denver 800 H.P. GXR, 3 LRDU Waukesha Diesel Engines, Steel Mud Tanks, 4½" Grade E Hand Banded Drill Pipe, 6¼" and 7¾" Drill Collars. This rig is priced right. For details contact

BOX H-307, THE OIL AND GAS JOURNAL,
Tulsa, Oklahoma

FOR SALE EQUIPMENT

WILSON GIANT—Serial No. 6383. Sales Price—$6,000. Equipped with Two Waukesha 145 GK Engines in good condition. General Appearance—Fair. Rig used for Work-Over. Price includes Kelco Spinning and Foster Breakout Catheads; Stromberg - McCreary Air Starters on Engines. Brakes circulating water-cooled; Manual Friction Clutches in Transmission; Others—Jaw Clutches. Rig has Slush Pump Drive and Rotary Drive. Location of Unit—Lake Charles, Louisiana. Contact Cardwell, Houston.

COMPLETE RIG: New U-15 Drawworks with four 250 Horse Power Cummins diesel engines through hydraulic couplings, hydromatic brakes on 127-foot 450,000-lb. Lee C. Moore mast and substructure, 8,000 Ft. 4½" Drill Pipe, 14 new 7" O.D. x 2⅞" Bore Drill Collars, new Emsco D-500 7½" x 16" pump, new Cameron twin hydraulic BOP, and all accessories. Good condition. Now drilling 8,000-foot well in Rocky Mountain area. Inventory on request. Box H-403, The Oil and Gas Journal, Tulsa, Oklahoma.

FRANKS MODEL 5000 Spudder—Serial No. 866. Sales Price—$7,500. Equipped with one Cummins HB1-600 Engine in good condition. Brake Rims in fair condition; Brake blocks—Good. General appearance—Good. Chains—Good. Basic Machine equipped with Spudding attachment. Skid and 65' Double Leg Pipe Mast with 8⅝" and 7" Pipe Legs; 4-Sheave Crown of Wilson Manufacture. Price includes Mast Guy Lines. Location of Unit—Western Kansas. Contact Cardwell, Wichita.

1—MODEL RL 3-Drum Cardwell Powered with Buda Model 844D Diesel Engine. Rig and Engine in Perfect Condition. 1-87' 2-Pole Mast. Box H-404, The Oil and Gas Journal, Tulsa, Oklahoma.

USED EQUIPMENT

Model E Allis-Chalmers Skid Unit mounted on International Truck. Located Great Bend, Kansas.

Franks 7000 Single Drum Skid Swabbing Unit mounted on Dodge Tandem Truck. Located Odessa, Texas.

Franks 8AL 4500 Skid Rotary Rig Cummins Power, 96' Derrick. Located, Tulsa, Oklahoma.

O.C.S. Type 1 Servicing Unit mounted on 1942 Mack Truck. Located Odessa, Texas.

Franks Super Senior Well Servicing unit 8 x 10 x 62 Single Pole Mast mounted on Tandem International Truck, Located Seminole, Oklahoma.

Write, wire or call Franks Mfg. Corporation, Box 5218, Whittier Station, Tulsa, Oklahoma.

GASOLENE PLANT
FOR SALE

Our Arkansas City, Kansas, Gasolene Plant is available for purchase and removal by January 1, 1955. Inventory and price upon request.

Cities Service Oil Company
PATRIDGE, BARTLESVILLE, OKLAHOMA

FOR SALE

Refinoil Plant for Reclamation of Oil. 90 to 100 gallon size.

Excellent condition.

Attractively priced.

Hyman-Michaels Company
122 South Michigan Avenue
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FOR SALE EQUIPMENT

FOR SALE: Hopper Blitz Rig 4,000 feet capacity—Bender Mast—G.M. Diesel powered—completely portable with tools, drill pipe. Krug Exploration and Drilling Co., P. O. Box 53, Station B, Bakersfield, Calif. Phone—Fairview 3-3529.

PAIR SURPLUS 1879 Buda engines completely overhauled since use, each equipped with Twin Disc 27-inch hydraulic couplings. Engines located Wolf Trucking yard, Edmond, Okla. Price for pair, $7,000.00. Chester H. Westfall, Phone 4-3144, Tulsa.

MODEL RL CARDWELL Three Drum Spudder, 65' Double leg mast reinforced for trunnion mount, heavy sub frame, powered by model 145 GK Waukesha Engine with combination natural gasoline, butane fuel system and fireproofing equipment. Also equipped with Wire Lines, Dog House, Light Plant and Tools ready to operate. Excellent Condition. 36L Type EB Bucyrus rig, Late Type, equipped with 145 GK Waukesha Engine, Wire Lines, Dog House, Light Plant and Tools, ready to operate. These rigs can be seen working in West Texas. Contact by phone, Midland, Texas, 2-4743 or write Route 1, Box 47C.

36,000' 8⅝" OD 18.97 Plain End Beveled New Southchester Lap Weld Line Pipe. For Quick Movement Offer Nice Discount. Pipe Located in El Dorado, Arkansas. Telephone, Wire or Write Louisiana Iron and Supply Company, Shreveport, Louisiana.

FOR SALE: GM 122400 (Twin 6-110). 415 continuous bhp. Torque converters. 12 months old. Excellent condition. Also, good used Buda JL-1335. Ike Ridenhour, 1758 N. Bluff, Wichita 14, Kansas.

FIVE TYPE 80 COOPER Gas-Engine compressors. Thirty 20-in. stroke compressor cylinders—size 5½ in. to 26 in. Pressures to 1,000 lbs. W. S. Smith, 205 Thompson Bldg., Tulsa, Okla.

FOR SALE: Model "K" Cardwell tubing and rod unit complete with tubing and rod tools, mast, mounted on Ford tandem truck. Melco Drilling Company, Seminole, Oklahoma. Terms.

20,000' 2¼" o.d. seamless line PE. 20' random lengths, good as new. A smart buy at 18c. M. J. Regan Pipe Co., Coffeyville, Kan.

SAVE MONEY
on
8" Line Pipe
Lapweld 8⅝" O.D. 28.55#

Very good #1 grade, used pipe. Straight 20' single random lengths, machine cleaned.

Choice of plain end bevelled for welding, or screw end threaded and collared.

Ideal for oil, water and gas systems, 850 to 900 psi.

Pipe located in Illinois, with low barge, rail and water rates to any part of the world.

Can ship unlimited quantities, at guaranteed rate of 28,000 feet per day.

Priced below market, selling at almost ½ cost of equivalent new pipe.

Will sell for cash, or will finance meritorious propositions.

Brokers and agents protected.

REDNEB PIPE CO.
P. O. Box 1798 Shreveport, La.
Phone 2-3276

FOR SALE EQUIPMENT

FOR SALE—At our Oklahoma City warehouse: 1 used 2½"-5" x 10" Gaso Power Pump, Figure 710-S, Serial No. 7435 on steel base and V-belted to HXE Hercules motor, serial No. 339493. Price $2000.00. Cities Service Pipe Line Company, Patridge, Bartlesville, Oklahoma.

FAILING MODEL 55 portable drill. Capable 2500 ft. drilling. Rig and pump powered with GMC diesels. Complete rig, including drill pipe, dog house, fuel tank, and operating tools. Now operating in eastern Kansas. M & G Drilling Co., 1102 East St., Iola, Kansas.

FOR SALE—At our Oklahoma City warehouse: 1 used 2"-5" x 10" Fig. 1450 Wheatley Power Pump, Ser. WBM 2060, mounted on steel base & DC to Buda BTH motor, Ser. No. 226569A. Price $2000.00. Cities Service Pipe Line Company, Patridge, Bartlesville, Oklahoma.

EQUIPMENT WANTED

WE WANT TO BUY—1—4" stationary head for old style 4" Landis Machine. W. H. Greer Supply Co., Owensboro, Ky.

WE WANT TO BUY—Treated Crude Oil Tank Bottoms. Box H-428, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WE PAY THE MOST for Used Line pipe, used casing, abandoned leases. Gore Oil Field Supplies. Box 1063, Tulsa, Okla.

HELP WANTED

CHEMICAL ENGINEER—with 2-4 years technical experience in petroleum refinery operations. Position in research and engineering department of chemical company in midwest area. Work invloves petroleum refining and fuel manufacturing relationships. Box H-372, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL DESIGN ENGINEERS

EMPLOYMENT OPPORTUNITIES

in

SOUTH AMERICA

Attractive staff positions available with affiliates of STANDARD OIL COMPANY (N. J.). Engineering degree and 3 - 5 years oil refinery or chemical plant design experience required.

Liberal salaries and benefits.

WRITE

giving age, education, marital status and detailed experience resume.

BOX 308-A
RADIO CITY STATION
NEW YORK 19, N. Y.

SOUTH AMERICA
MAJOR OIL COMPANY

HAS OPENINGS IN COLOMBIA FOR

Petroleum Engineer (Equipment)—At least four years' experience as equipment engineer for testing, maintenance and operation of drilling and production equipment.

Drilling Engineer—Prefer Petroleum Engineer with six to eight years' minimum in drilling activities. Thorough knowledge modern drilling practices and techniques. Some administrative experience.

Petroleum Engineer—Minimum four years' experience in work-overs, well completion, maintenance and operation of drilling and production equipment.

AGE LIMIT 40 YEARS
SALARY OPEN

BOX H-432,
THE OIL AND GAS JOURNAL
TULSA, OKLAHOMA

HELP WANTED

OIL INDUSTRY Employment Service. Tom Robinson, owner, 405 Tuloma Bldg., Tulsa, Oklahoma. For technical and trained oil industry personnel. Write for blank.

TRAINING SUPERVISOR. Excellent opportunity in Rocky Mountain Area. Must be experienced in this work, under 30, college graduate preferred. Salary to $500. All replies confidential. Send complete resume to CHAS. J. LOVELESS PERSONNEL SERVICE, 616 S. Main, Tulsa, Oklahoma. Phone 4-3193.

PROCESS ENGINEERS
Chemical Engineers with advanced degrees required for process design and evaluation work. Minimum five years' experience in process design petroleum or organic chemical facilities required. Send complete resume. Box H-420, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—Senior Research, to work in New York. Applicant should have advanced degree and broad experience in petroleum geology, foreign and domestic. Work involves compilation of geological data, evaluation of foreign petroleum prospects and preparation of reports. Important petroleum organization offers this position of responsibility and appeal to the right party. Pay commensurate with education and experience. Age range, preferably 35 to 50. Submit resume in detail. Box H-417, The Oil and Gas Journal, Tulsa, Oklahoma.

PERSONNEL FOR OIL INDUSTRY

Louisiana-Mississippi Area
Engineers-Technicians-Roughnecks
Clerical-Sales

APEX EMPLOYMENT SERVICE
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Phone EXpress 2307

FOR A BETTER-PAID JOB

Production and Reservoir Engineers, Geologists, Draftsmen; Geophysicists, Party Chiefs, Computers and Field Crew Staff. WRITE US—STRICTEST CONFIDENCE.

GOOD EMPLOYMENT AGENCY
1554 California, Denver. AC 0835

PETROLEUM ENGINEERS

Experienced graduate engineers or recent graduates, for immediate and future job openings in Saudi-Arabia and New York City. For engineering work in development, production, drilling, process, and oil and gas engineering on primary and secondary recovery problems.

Salaries commensurate with education and experience. Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 79

ARABIAN AMERICAN OIL COMPANY
505 Park Avenue
New York 22, N. Y.

GASOLINE PLANT OPERATORS

Experienced gasoline plant operators needed by substantial independent. Location Central West Texas. Company new and expanding. Liberal insurance, vacation, and other benefits. When replying give age, experience, availability.

BOX H-425,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

MUD PUMP DESIGN Engineer with experience to develop line of pumps for Drilling Rigs. Please give record of education and experience and salary expected. Box H-427, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Distributor for Gas Lift Equipment in West Texas. Preferably Engineering or sales organization now operating in West Texas. Commission far above average. Macco Oil Tool Co. Inc., P. O. Box 7288, Houston 8, Texas.

REFINERY
PROCESS OPERATORS
Age 25-38

Required by major oil company for career opportunities in South America.

Will work with or as shift foreman under general foreman in instructing and assigning duties to operating personnel, keeping close check on process variables, product quality, feed and effluent rates. Should be well grounded in safety practices, start up and shut down procedures, refinery or chemical process instrumentation. Fluid catalytic cracking experience highly desirable but not essential. Minimum requirements: High School education or better, 3 to 10 years experience as refinery process operator with at least one year in supervisory capacity. Salary plus bonus $10,000-$13,000. Also liberal benefits, tax savings, and home vacations with traveling expenses. Replies confidential.

Box 1540
Dept. L-21
General Post Office
New York 1, New York

SITUATIONS WANTED

SALES ENGINEER. Interested in a connection with a progressive company which does not require excessive travel; experience includes introduction of new processes; presently located at Wichita Falls, Texas, will relocate for the right deal; has wide acquaintance in oil industry and related fields. Box H-413, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST - GEOPHYSICIST. 36, Married, degree in geology, 14 years of interpretation and supervisory experience, desires position in permanent location. Box H-418, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Single, 29 years old, B.S. degree plus some graduate studies. 18 months geological well site logging; 18 months in geophysics. Desire position in exploration geology—domestic or foreign. Box H-424, The Oil and Gas Journal, Tulsa, Oklahoma.

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties, from acquisition to production. No properties too small, and none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited.

Write, wire, or call collect for further information.

MAKIN DRILLING COMPANY
P. O. Box 1628, Hobbs, New Mexico,
Phone 3-3141.
146 Allen Building, Midland, Texas,
Phone 2-2962.

SITUATIONS WANTED

PETROLEUM ENGINEER, 34, Married, 10 years—part time supervisory—diversified drilling, producing, remedial, reservoir, and associated experience in Gulf Coast. Desire position with organization offering opportunity for advancement. Will relocate. Box H-442, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Independent Producers. Has the gas or natural gasoline aspect of your business grown until it needs experienced attention? Graduate Engineer, forty-two years of age with broad experience in gas-gasoline phase desires connection with progressive company. Experience includes production, design, construction, and operation of gas-gasoline plants including purchase and sales contracts. Box H-412, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, M.S., 35, family, 7 years experience including one year in oil. Experienced in Recent Sedimentation and Stratigraphy, also research. Box H-435, The Oil and Gas Journal, Tulsa, Oklahoma.

OCEANOGRAPHER, Geological, 35, 5 years responsible experience in Coastal Engineering. Box H-438, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—6 years experience. Practical Petroleum and Production Engineering field work last 2 years. Consider proposals all areas. Box H-439, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER—Fourteen years experience in drilling, production, geology, reservoir engineering, and property evaluation in the United States, Venezuela, and Western Canada for the past three years. Desires permanent responsible position with progressive large independent preferably in Western Canada or Rocky Mountains. Available on short notice. Box H-433, The Oil and Gas Journal, Tulsa, Oklahoma.

MATERIAL MAN—15 years office and field experience. Drilling and Production. Best references. Box H-431, The Oil and Gas Journal, Tulsa, Oklahoma.

PATENT LAWYER, age 38, petroleum technologist with considerable petro-chemical experience. Presently holds position of responsibility in large corporate patent department. Seeks to organize and/or manage patent department. Capable of conducting all phases of patent matters, contract negotiations & assisting with research problems. Replies will be kept confidential. Box H-441, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITY

A RARE opportunity to acquire a substantial interest in a five year old drilling company for a man who has the ability to secure drilling contracts. Write Box H-443, The Oil and Gas Journal, Tulsa, Oklahoma.

WE HAVE EXTENSIVE deposit of sand-fract sand, located in the center of sand-fract area. We wish to contact reliable, well-established firm or group to produce and market this sand. Good freight advantage and depletion allowance. Sand approved by major users. Contact G. H. Billue, telephone 2-4067, 615 Sunset Drive, Wichita Falls, Texas.

$69,000 HAS GROSSED over $500,000 in first 2 years. Producer of 60 low cost motion pictures desires asso. to finance popular adventure pictures in full color. Money repaid from entire first returns plus 45% share. Tax ad. Low risk. Box H-444, The Oil and Gas Journal, Tulsa, Oklahoma.

GAS MEASUREMENT SERVICES

GAS CHARTS INTEGRATED

SERVING CUSTOMERS IN 14 STATES.
FAST RETURN SERVICE.

A sure and economical method of obtaining gas volume computations. Send one chart or 10,000. Write or 'phone for further information.

JOHN P. SQUIER CO.
P. O. Box 6100, Dallas 22, Texas
'phone Woodlawn-4484

ROYALTIES

WISH TO BUY producing royalties. Box H-379, The Oil and Gas Journal, Tulsa, Oklahoma.

JACK EAGLE, Oil Properties, 706 City Nat'l Bldg., Oklahoma City, Oklahoma. Telephone REgent 6-7027.

OFFERING CHOICE PRODUCING oil income royalties with large reserves per Dollar investments. A. S. Berry, 522 Wright Bldg Tulsa, Okla.

LEASE AND DRILLING BLOCKS

RECENTLY ORGANIZED group seeking drilling deals accompanied by complete geological reports. Box H-423, The Oil and Gas Journal, Tulsa, Oklahoma.

$2250.00 drills, oversees, 920 ft. well. 120 OKLA. lease. Offsetting 6 Bbl. Natural well. Sixteenth override. Geologists report, maps, logs. Chas. Byron, 1071 York, Denver, Colo.

Will pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

SEE A. L. BOWLES, Box 947, Ada, Okla., for drilling deals and producing royalties if you have the cash for Oil Investments.

WANT TO DRILL on proven acreage. Have some income tax money. Prefer Texas, Oklahoma or Illinois. Moderate depths only. Replies confidential. Box H-402, The Oil and Gas Journal, Tulsa, Oklahoma.

11 BILLION FEET of gas reserves in new shallow sand development. Property is presently marketing million feet per day. Detailed information available to qualified parties interested in making a deal. Box 2, Clarendon, Penna.

WELL TO BE DRILLED soon on already producing anticline in the heart of real oil country. Natural and hydrafrac possibilities. Interest reasonable. Box H-440, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

GEOPHYSICAL SERVICE

EXPERIENCED ACCOMPLISHMENT of your required Exploration Mapping, Geological Investigations, appraisals of leased acreage and general co-ordinated representation in Central and Eastern Oklahoma. References exchanged. Paul M. Jameson, 1516 North Boston, Tulsa 6, Oklahoma, phone 3-1713.

ELECTRIC LOG CABINETS

FOR ECONOMICAL FILING of full-size electric logs, most geologists prefer Kraftbilt E-24 4-drawer Electric Log Cabinet. Two compartments to each drawer with separate follow-blocks make this cabinet handy, economical. For filing reduced electric logs, geologists use Kraftbilt E-28 8-drawer cabinet. Send for Catalog 352-B. Ross-Martin Co. P.O. Box 800-A, Tulsa, Okla.

BUSINESS SERVICE

Delaware Corporations formed and serviced, American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

WANTED

WANTED COMMISSION SALES for Oilfield Equipment in Kansas, have ample Warehouse, Yard and Showroom Space. Qualified Salesman, experienced stockman, also rental space available for consigned material. Write Box H-436, The Oil and Gas Journal, Tulsa, Oklahoma.

REAL ESTATE

FOR SALE: Modern Air-Conditioned office building, suitable for medium size petroleum or allied firm. Equipment yard and garage with adequate parking facilities located in a desirable area of Tulsa. Box H-369, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION WANTED

HAVE CASH BUYER for up to one million dollars in production in one or more leases. Prefer Okla., but would consider Arkansas, Texas, Kansas, La. Would like partially developed leases. Include full details in reply. Box H-437, The Oil and Gas Journal, Tulsa, Oklahoma.

NEWLY ORGANIZED syndicate wants to buy 5,000 to 30,000 barrels oil monthly production. You will deal direct with principals. Prompt action. Evaluation report must accompany submittal. Box H-422, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION WANTED

We will purchase any amount of settled production up to 500 barrels per day provided you control operations. Interested in Kay, Logan, Noble, Garfield, Payne, Pawnee, Creek, Okfuskee or Lincoln Counties. We are producers and operators and will furnish bank references if your proposition interests us. Would like full details with first letter.

BOX H-415,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA

WILDCAT COMPLETIONS

(Continued from page 178)

KANSAS

Barton County: Shelley-Miller 1 Nuss, SW SW NW 9-16s-14w. Dry. TD 3,440 ft.

Comanche County: Falcon Seaboard-Deep Rock Oil Corp. et al 1 Alexander, C S½ NE NE 5-35s-20w. Dry. TD 5,649 ft.

Cowley County: Adair 1 Fusch, NW SW SE 13-30s-4e. Dry. TD 2,891 ft.

Ellis County: Wood River 4 Dechant, NW NE NE 14-15s-18w. IPF 3,000 BOPD, Lansing 3,321-29 ft. TD 3,616 ft. (New pay at East Leiker.)

Greenwood County: Race Parks 1 Marlin, SW SW NE 22-25s-10e. Dry. TD 2,158 ft.

Harper County: Adair et al 1 Robinson, SW SW NW 22-32s-6w. Dry. TD 4,798 ft.

Gulf Oil Corp. 1 Rife, SW SE SW 31-33s-6w. IP 81 M.c.f. of gas per day, Miss. 4,486-4,502 ft. TD 5,147 ft. (Gas discovery.)

Kingman County, Purcell & Mull 1 Whitmer, SW SW NW 10-30s-9w. Dry. TD 4,614 ft.

Norton County: Petroleum, Inc. 1 Allan, SE SE NE 30-3s-22w. Dry. TD 3,910 ft.

Pawnee County: Derby Oil Co.-Coppinger 1 Grant, SE SE NE 27-22s-18w. Dry. TD 4,685 ft.

Reno County: Trans-Era and Morris Mizel, SW SW SE 13-26s-5w. Dry. TD 4,158 ft.

Russell County: Jones, Shelburne & Farmer 1 Bender "B," NE NE SE 17-13s-14w. Dry. 3,410 ft.

Stafford County: Dor-Bet and Thunderbird Drilling Co. 1 Asher, SE SE NW 9-21s-14w. Dry. TD 3,682 ft.

Sumner County: Derby 1 Foltz, NE SW NE 29-20s-1e. Dry. TD 3,915 ft.

Trego County: Continental Oil Co. 1 Caskey, SW SE SE 14-13s-22w. Dry. TD 4,389 ft.

NEBRASKA

Kimball County, Hafeman: Eddie Fisher 1 Hafeman, SE SE NE 23-14n-55w. IPP 265 BOPD, "J" sand discovery, new field. TD 6,210 ft.

SOUTH DAKOTA

Harding County: Amerada 1 South Dakota State "A," C NE NE 1-16n-1e. Dry. TD 3,994 ft. Dakota.

NORTH DAKOTA

Benson County: Shell 1 Blegen, SW SE 14-155n-67w. Dry. TD 2,396 ft. Duperow.

McKenzie County, Rough Creek Unit: The California Co. 1 Rough Creek Unit, NW NE 13-148n-98w. Dry. TD 12,050 ft. Souris River.

CALIFORNIA

Humboldt County: Richfield Oil Corp. 1 Graham, 30-1s-2w. Dry. TD 3,022 ft.

Kern County: Drilling & Producing Co., 71-32 Trico, 32-28s-20e. Dry. Bottomed in Point of Rocks, TD 4,182 ft.

A. O. Preszler, 2 Preszler & Phillips, 14-11n-18w. Suspended. TD 997 ft.

Ohio Oil Co. 1 Fred E. Smith-Government, 23-30s-21e, IPF 2,268 BOPD, 20/64-in. choke, 32°-gravity, perfs. 5,608-86 ft., Oceanic sand 5,605 ft., TD 5,810 ft. (New pool discovery in Belgian Anticline field.)

The Texas Co. 2 Overall, SW NE 33-25s-20e, IPP 32 BO and 241 BW per day, 22°-gravity, perfs. 2,145-3,176 ft., TD 3,278 ft. (New field discovery in Northwest Lost Hills area.)

Orange County: Shell Oil Co. 1 Shell-Travis, 36-3s-9w. Dry. TD 6,158 ft.

San Joaquin County: Bishop Oil Co., 1 Lippert, 27-4n-6e. Dry. TD 4,113 ft.

Santa Barbara County: Intex Oil Co., 1 Lagomarsino, 33-7n-35w. Dry. TD 2,799 ft.

Ventura County: James Jansen, Jansen 1-27-S, 27-4n-21w. Suspended. TD 3,720 ft.

Standard Oil Co. of California 301 Standard-Lenox, SE NW 6-1n-21w, IPF 330 BOPD, 14/64-in. choke, 28° gravity, 220 M.c.f. gas, perfs. 6,785-7,008 ft., TD 10,522 ft. (Approx. ½ mile southeast extenson to Oxnard field.)

MONTANA

Carter County, Box Elder Creek: Warren Petroleum Corp. 1 Curry, C NW SE 20-1s-60e. Dry. TD 8,600 ft. Winnipeg.

Glacier County, Landslide Butte: Union Oil Co.-Carter Oil Co. 1 Tribal 544, C NW NW 19-37n-8w. Dry. TD 5,867 ft. Exshaw.

Liberty County, South Chester area: Amerada Petroleum Corp. 1 Paul, C SW NW 11-29n-6e. Dry. TD 4,125 ft. Jefferson.

South Chester: Amerada 1 Kinread, NW NW SW 29-39n-4e. Dry. TD 2,288 ft. Madison.

Valley County, Tampico: Seaboard Oil Co. 1 Government, C SE NW 5-30n-39e. Dry. TD 7,218 ft. Winnipeg.

WYOMING

Laramie County: Pure Oil Co. et al 1 Rinehart, C SE SW 22-16n-61w. Dry. TD 8,791 ft. Blaine.

Natrona County, Shannon area: Natural Gas & Oil Corp. and McElroy 1 Shannon-Midwest-Government, SW NE SW 1-40n-79w. Dry. TD 3,950 ft. Morrison.

Park County, North Horse Center: John R. Miller 1 Government-House, C SE NE 14-52n-102w. Dry. TD 585 ft. Tensleep.

Sweetwater County, Alkali Creek: The Chicago Corp. and Republic Natural Gas Co. 7 Butterwick-Government, W½ SW NE 19-13n-99w. Dry. TD 6,003 ft. Mesaverde.

Teton County, Ramshorn Unit: Rocky Mountain Corp. 1 Ramshorn Unit, SE SE NE 9-43n-114w. Dry. TD 3,722 ft. Derby.

COLORADO

El Paso County: Eddie Fisher and Joseph M. Gross 1 Rosner, SW SW NW 25-17s-60w. Temp. abd. TD 3,430 ft. base Dakota.

Logan County: Falcon Seaboard 1 Brauer, NW NW SE 30-12n-54w. Dry. TD 5,995 ft.

Ray Lowell, Weimer & Fitzhugh 1 Stair, NW NE NE 1-6n-54w. Dry. TD 4,849 ft.

McDermott & Barnhart 1 Whittier "D," C NE NE 27-9n-53w. Dry. TD 5,010 ft.

Petroleum, Inc. 1 Wagner "A," SW SW NW 27-9n-53w. Dry. TD 5,060 ft.

Morgan County: J. A. Rose and Denver Basin 1 Brungardt, SW SW SW 15-3n-56w. Dry. TD 5,426 ft.

B. F. Allison Drilling Co. 1 Drew, SE SE SW 24-6n-58w. Dry. TD 6,393 ft.

Phillips County: Dietler & Oleson, Inc. 1 Hughes, SW SW SW 18-6n-42w. Dry. TD 3,603 ft. Morrison.

Washington County, Big Beaver: New Drilling Co. 1 Blomenkamp, C NE NE 17-3s-56w. IPP and IPF 605 BOPD, "J" sand discovery, new field, TD 5,135 ft.

Earl Rowe 1 Claypool, SE NE SE 27-2s-49w. Dry. TD 3,876 ft.

Shell Oil Co. 1 Walczyk, C NE NE 21-2s-54w. Dry. TD 4,830 ft. Dakota.

Weld County, Spurgin field: Phillips Petroleum Co. 1 Arnold-King, SE SW NE 13-11n-57w. IPF 106 BOPD, "D" sand discovery, new field. TD 6,581 ft.

MANITOBA

Dome-Harris-Cox 14-23 Ebor, LSD 14, 23-9-29w1. Indicated Miss. oil discovery. TD 2,711 ft.

Sapphire 3-28 Manson Town, LSD 3, 28-13-29w1. Dry. TD 2,480 ft.

Dome-Harris-Cox 3-13 North Routledge, LSD 3, 13-10-25w1. Dry. TD 1,949 ft.

SASKATCHEWAN

Texaco A-6-30 Consul, LSD 6, 30-3-27w3. Dry. TD 4,640 ft.

Socony-Woodley-Southern 26-3 North Sidewood, LSD 3, 26-13-22w3. Dry. TD 3,654 ft.

Socony-Woodley-Southern 18-13 West Simmie, LSD 13, 18-11-17w3. Dry. TD 4,550 ft.

ALBERTA

Gulf 13-21 Harmon, LSD 13, 21-82-20w5. Dry. TD 6,965 ft.

Imperial 9-9-44-17 Rosalind, LSD 9, 9-44-17w4. Dry. TD 5,255 ft.

Equipment Men

Cameron Names Baker To Manage Latin-America Area

I. M. BAKER

I. M. Baker has been appointed division sales manager for Mexico and South America for Cameron Iron Works, according to an announcement by Hammond A. Helms, general manager of Cameron's oil tool division. Baker was formerly division sales manager of the Houston division. His headquarters will continue to be in the Houston office.

R. C. Brooks is now division sales manager of Cameron's Houston division, and G. L. Teer, who until recently was division sales manager of the West Texas division, has been transferred to Calgary, Alta., Canada, as division sales manager, Cameron Iron Works of Canada, Ltd. Teer was replaced by T. G. Roscoe.

R. C. BROOKS

G. L. TEER

ADVERTISERS

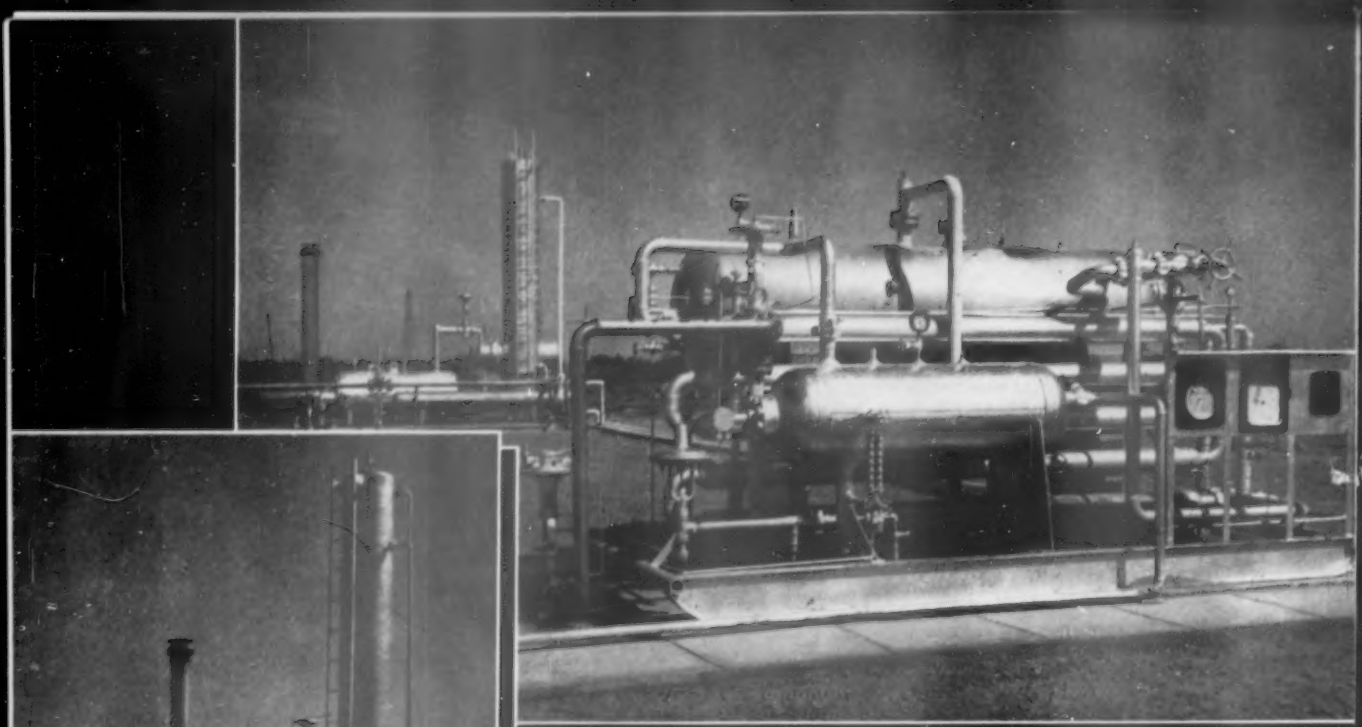
ACF Industries, Incorporated 18
Aero Design and Engineering Company 103
Air Preheater Corporation, The 123
Allis-Chalmers Mfg. Co. 14
Alten Foundry & Machine Works, Inc. 164
American Iron & Machine Works Co. 108
Anchor Petroleum Company 42
Anglo-Iranian Oil Company, Ltd. 89
Attapulgus Division Minerals & Chemicals Corporation of America 143
Baird Mfg. Co. 169
Baker Oil Tools, Inc. 40
Baroid Sales Division, National Lead Company 179, 180
Bethlehem Supply Company 83
Brewster Company, Inc., The 28, 30, 31, 32
Cabot Shops, Inc. 138
Campbell Chain Company 141
Central Scientific Company 10
Chain Belt Co. 8
Charles Machine Works, The 120
Classified Advertising 191, 192, 193, 194
CF&I Tubular Products, The, Colorado Fuel and Iron Corporation 22
Continental Supply Co., The 133
Crane Co. 2
Crose Manufacturing Co., Inc., M. J. 129
Crossley-Premier Engines, Ltd. 106
Dean Brothers Pumps, Inc. 169
Deublin Company 35
Dow Chemical Company, The 124
Dowell Incorporated 154, 155
Dresser Manufacturing Division 136
Drilling & Service, Inc. 177
Dunham Tanks Division of Anderson-Dunham, Inc. 110
du Pont 24
Eastman Oil Well Survey Company 11
Edward Valves, Inc. 119
First National Bank & Trust Co. of Tulsa, The 163
Fleet-Line Co. 127
Fluid Packed Pump Company 113, 114
Fort Worth Steel & Machinery Co. 105
General Controls 126
Globe Steel Tubes Co. 26
Goodrich Company, B. F. 3
Grancell, I. H. 171
Graver Tank & Mfg. Co., Inc. 182
Guiberson Corporation 168
Halliburton Oil Well Cementing Co. 9, 173
Harbison-Fischer Mfg. Co. 140
Hercules Tool Company 106
Houston Contracting Company 129
Hughes Tool Co. Back Cover
IDECO one of the Dresser Industries 137
Inferno Co., The 119, 141
International Business Machines Corporation 20
Johnson Motors 12
Johnston Testers, Inc. 13
Jones & Laughlin Steel Corporation Supply Division 36
Kaiser Steel Corporation 152
Kenyon & Sons, Ltd., William 148
Kerrigan Iron Works, Inc. 167
Kewanee-Ross Corporation 17
Klinger Limited, Richard 99
Lane-Wells Company 118
Larkin Packer Company, Inc. 160
Link-Belt Company 27
Macco Oil Tool Co. 141
Magnet Cove Barium Corp. 134
Maloney-Crawford Tank & Mfg. Co. 116
Marquette Metal Products Co., The 128
Martin, Manufacturer, John N. 162
McKissick Products Corporation 172
Mid-Continent Supply Company 165
Mission Mfg. Company 92, 93
Morgan Stanley & Co. 170
National Airoil Burner Co., The 121
National Bank of Tulsa 104
National Tank Company 196
Norris Manufacturer, Inc., W. C. 38
Oakite Products, Inc. 122
Oil and Gas Journal, The 120, 169
Oil Center Tool Co. 16
OPW Corporation 5
Orbit Valve Company 149
Otis Pressure Control, Inc. 145
Page Fence Association 174
Parkersburg Rig & Reel Co. 6
Parlow Corp., The 150
Peerless Supply Co., Inc. 127
Penn Controls, Inc. 102
Petroleum Distributing Co. 120
Phoenix Manufacturing Company 150
Porocel Corporation 143
Ratigan, Inc., J. P. 174
Reed Roller Bit Company 175
Refinery Supply Co., The 108
Republic Steel Corporation 25
Republic Supply Company 156
Rockwell Manufacturing Company Inside Front Cover
Rust-Oleum Corporation 7
Safe Lighting, Inc. 84, 85
Sargent Engineering Corporation 95
Schlumberger Well Surveying Corp. 10
SKF Industries, Inc. 33
Snare Corporation, Frederick 151
Socony-Vacuum Oil Co., Inc. 23
Southern Mill & Mfg. Co. 142
Steel Forgings, Inc. 127
Taylor Forge & Pipe Works 130
Toledo Pipe Threading Machine Co. 35
Unit Rig & Equipment Co. 146
United States Steel Corporation
Stainless Steel 21
U. S. Steel Supply Division 144
U. S. Steel Corp. Subsidiaries 4, 21, 144
United Supply & Manufacturing Co. 176
Vickers Incorporated 15
Visco Products Co., Inc. 81
Wallace & Tiernan Products, Inc. 37, 150
Warren Petroleum Corporation Front Cover
Web Wilson Oil Tools 120
Weil Equipment Mfg. Corp. 34
Wheeling Machine Products Co. 166
Wichtex Machinery Company, Inc. 139
Williamson, Inc., T. D. 153
Wilson Foundry & Machine Company 28
Witte Engine Works Oil Well Supply Division, United States Steel Corporation 4
Wood's Sons Co., T. B. 121
York Co., Inc., Otto 146
Youngstown Sheet and Tube Company Inside Back Cover

LEGAL

SEALED BIDS will be received until 2:00 P. M., Mountain Standard Time, October 5, 1954, and opened at that time in the Office of the Fort Peck Indian Agency, Poplar, Montana, for the leasing of 14,287.41 acres of Tribal land and 37,485.37 acres of allotted Indian land, located in Roosevelt and Valley Counties, Montana, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent of the Fort Peck Indian Agency, at Poplar, Montana, or telephone, Poplar, 2181.

LEGAL

U. S. DEPARTMENT OF INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 192.73 acres of land within the known geologic structure of the Hell's Hole Canyon Field in Rio Blanco County, Colorado, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 p.m., E.S.T., September 29, 1954, when bids will be opened. Details of the lease offering, description of the lands, how and where to submit bids, and bid forms may be obtained from the Manager of the Land Office, Denver, Colorado, or from the Director, Bureau of Land Management, Washington 25, D. C. L. E. Hoffman, Minerals Officer.



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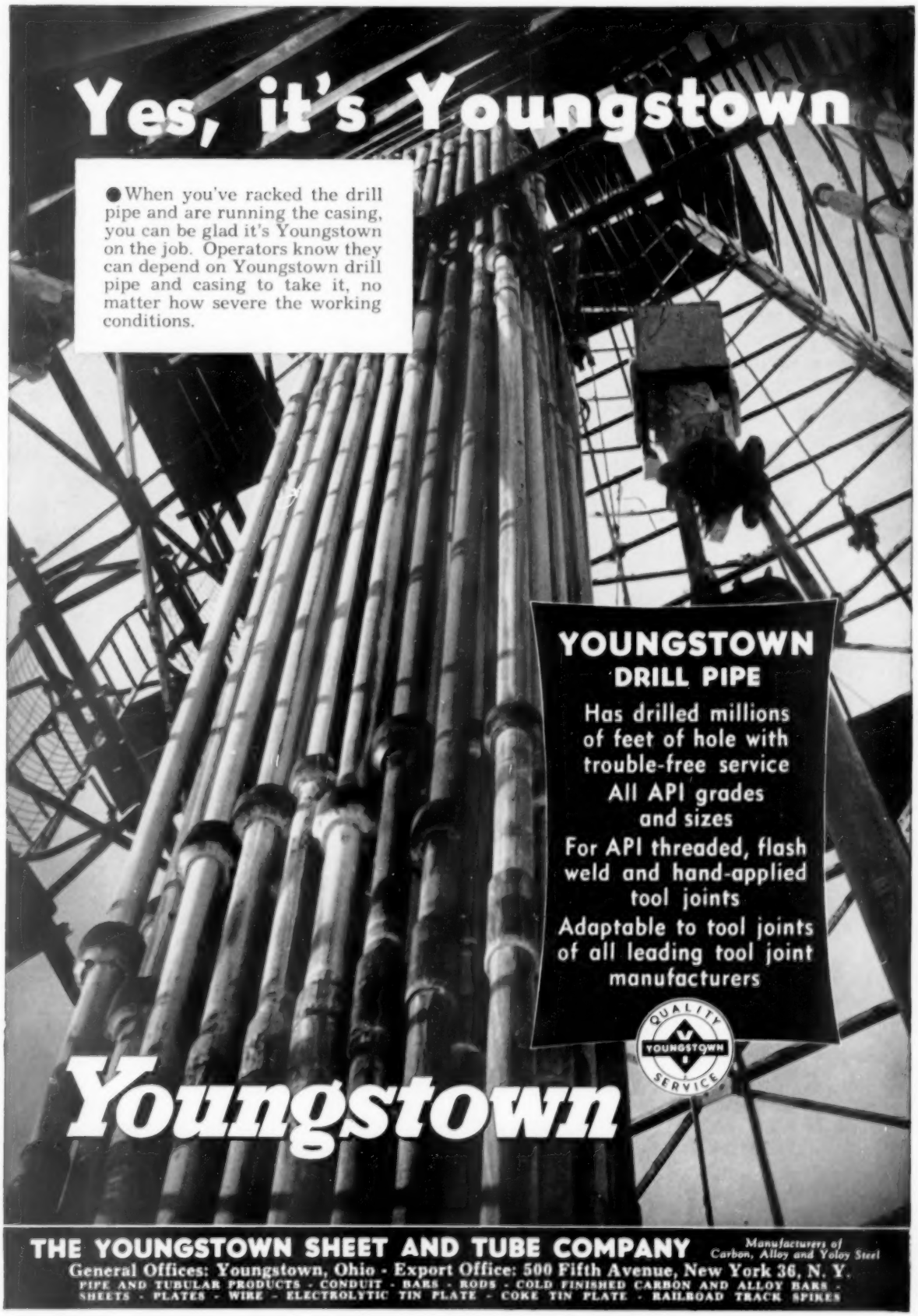
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